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# USSR Report

MILITARY AFFAIRS

AVIATION AND COSMONAUTICS

No. 1, January 1984

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21 March 1984

## USSR REPORT MILITARY AFFAIRS

### AVIATION AND COSMONAUTICS

No. 1, January 1984

Except where indicated otherwise in the table of contents the following is a complete translation of the Russian-language monthly journal AVIATSIYA I KOSMONAVTIKA published in Moscow.

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## COL GEN GOLUBEV ON DUTIES OF INTERCEPTOR PILOTS

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 1, Jan 84 (signed to press 2 Dec 83) pp 1-3

[Article by Col Gen Avn S. Golubev, Hero of the Soviet Union, Honored Military Pilot of the USSR: "A Mission of National Importance"]

[Text] The resplendent Air Force flag slowly rises up the flagstaff to the solemn sounds of the Hymn of the Soviet Union. The formation of aviators beginning their combat watch froze in silence, eyes fixed on the banner trembling in the breeze. In these moments all feel special pride in belonging to the glorious breed of winged defenders of the air borders of the Homeland, and a great sense of responsibility for the mission entrusted to them. But then the melody of the hymn ceases. The command of the senior officer rings out:

"Begin the watch!"

Every day, in accordance with established regulations, aviators begin their watch in defense of the skies of the Soviet Union, the land and sea borders of which extend almost 67,000 km. The natural and man-made resources of our Homeland are great. The hard working Soviet people under the wise leadership of the CPSU have created tremendous material, cultural and spiritual treasures and entirely new socialist production relations, and are constantly developing the country's economy and confidently building the bright future of communism. The Soviet people have something to be proud of. The soldiers of the USSR Armed Forces have something to defend.

The successes of our state and the other countries of the socialist community give no rest to the apologists of imperialism. In the historical argument between the two opposing social and economic systems, the imperialist plunderers rely on the force of arms. The American militarists have created hundreds of naval, air and missile bases along the borders of the USSR and its allies. Military ships and submarines carrying nuclear weapons ply the seas and oceans close to our borders. In the air, reconnaissance aircraft and strategic bombers -- carriers of nuclear death -- are constantly on patrol. Every year hundreds of provocations are committed on the borders of the socialist countries. All possible methods and resources are used for this, even including the incursion of civilian airliners into their airspace for reconnaissance, as took place on the night of 1 September 1983 in the Soviet Far East. The enemies of socialism test the strength of the borders of the socialist community and check the vigilance of its armed forces.

Armed conflicts, in which American Armed Forces openly demonstrate their "iron muscles" to the whole world, break out time and again in various parts of the world, like links in the single chain of imperialist military adventures. The combat operations in Lebanon and Grenada are examples of this. Seeking to achieve a special place in the world for itself, the U. S. and its NATO partners whip up war hysteria and hold mankind under the threat of a nuclear catastrophe. The main aim of this militaristic racket, judging from the Defense Directives for Fiscal Years 1984-1988 developed at the instructions of the American president, are the "destruction of socialism as a social and political system."

The powerful armed forces of the USSR and the other Warsaw Treaty Organization member countries prevent implementation of the insidious plans of the nuclear maniacs. Their armies, navies and air forces are equipped with everything necessary to rebuff decisively any encroachment upon the honor, freedom and independence of their peoples, no matter from where it may come. Defending a just cause, the USSR along with the other socialist countries, recognizing the soundness of their position, firmly and consistently struggle for detente and to preserve and strengthen peace. The humane policy of our state is expressed in the declarations of Yu. V. Andropov, general secretary of the CPSU Central Committee and chairman of the Presidium of the USSR Supreme Soviet, and in the new Soviet peace initiatives aimed at curbing the arms race and reducing the military danger in Europe and throughout the world. The peace-loving peoples of the planet fervently approve of and support the proposals of the Soviet Union, since they answer their vital interests.

However, the present U. S. administration stubbornly adheres to its adventurist, militaristic policy in international affairs. "The essence of this policy," states Yu. V. Andropov in his Declaration, "is to attempt to secure a dominant position in the world for the United States of America, while ignoring the interests of other states and peoples."

Striving through force to appropriate for itself the right to control the destinies of sovereign countries and peoples, the American military and political leadership has put in motion military preparations of unprecedented scale. More than 400 major military programs of various sizes are aimed at achieving strategic superiority over the USSR. In U. S. plans for an unrestrained arms race, a special place is reserved for the construction of the B-1B and "Stealth" strategic bombers; deployment of Trident-2 nuclear missile submarines; further production of nuclear and chemical munitions; and creation of new types of weapons of mass destruction based on entirely new principles and properties.

In addition, the U. S. and NATO countries are constantly modernizing and improving the conventional weapons and military equipment of their ground forces, air forces and navies. Desiring, no matter what, to destabilize the existing military equilibrium, the U. S. government under the pressure of its most militant circles began deployment of its cruise and Pershing-2 missiles in several Western European countries ahead of schedule, thus putting the peoples of Europe in the role of nuclear hostages and threatening peace and quiet in this region.

This, it turns out, isn't enough for the American imperialists with their dreams of world domination. The United States also plans to militarize space and make it an arena of military confrontation. In 1982 a special Space Command was created within the U. S. Air Force, intended to coordinate and control military operations in space.

Each year incredible sums are allocated from the U. S. federal budget to implement these senseless plans. For Fiscal Year 1984 alone Congress allotted \$280 billion for military programs. A stream of weapons, which the militant generals are prepared to rain down on the heads of mankind, is flowing into the Pentagon arsenals. This forces the Soviet Union to strengthen its Army and Navy and maintain them in constant combat readiness. Soviet aviators, along with personnel of the other Armed Services, are vigilantly keeping track of the imperialist intrigues and are ready to stop any provocation.

Training pilots and support personnel for combat watch is one of the most important tasks in the system of military training for air units and subunits. It is namely on watch that the men's ability precisely and harmoniously to function in an emergency situation, and their moral and political maturity, psychological preparedness and best martial qualities are fully displayed.

As is known, combat watch duty in Air Force units is an urgent task which does not permit any possible conventionality. When he receives the command to take off, the pilot must have in mind that he is going to meet a real enemy. This also places special responsibility on those who ready the flight equipment and support the operational flight. They also must act quickly and dextrously, and strive to better the established norms. All personnel must remember that a second of delay enables the air enemy to approach the defended facility.

The combat readiness of on-watch subunits is made up of many components and depends entirely on how purposeful is the training of the soldiers in various specialties for watch duty; how well organized is the deployment, support, air-raid warning and maintenance of on-watch subunits; and how thoroughly the personnel realize their responsibility for fulfilling the missions of national importance entrusted to them.

Undoubtedly the most important person in combat watch duty is the pilot, the crew commander, who is directly responsible for accomplishing the mission in the air. For this he must be completely prepared for combat operations. This means that the pilot cleared for watch duty must know well his airplane, its sighting and navigation systems and its weapons. He must be able to use all of their inherent capabilities, skillfully pilot the aircraft at all altitudes and profiles under various weather conditions, right down to weather minimums, and competently use his armaments.

In addition to knowledge of his military equipment and high level of piloting skill, the pilot's psychological stability, moral and political maturity and tactical skill are important elements in his preparedness for combat.

Taking off on command, as a rule the pilot does not know what he will face in the air. He will receive this information only after take-off. The reason may



be the appearance of any flying apparatus, including an aircraft experiencing an accident in close proximity to the state border. In any case he must be prepared to meet the enemy face to face, or to do what he can to help a crew which has unintentionally violated established flight corridors.

It may happen that the airfield is closed due to cloud cover or fog. Heavy snowfall, rain or ice on the runway are all conditions under which training flights are seldom conducted. But when on watch duty a pilot must take off no matter what, and in so doing display all his skill. There can be no conventionality in this regard. The main thing is to intercept the intruder, since the smallest delay may bring serious, if not even irreparable consequences. It is entirely possible under the most difficult weather conditions that it will be necessary to land at another airfield or abandon the aircraft by ejecting. The pilot must be psychologically prepared for this.

Another no less important aspect of a pilot's readiness is closely linked with ideological tempering and tactical training. As he approaches the intruder the pilot must determine the nationality of the aircraft by use of on-board instruments, information received from the command post, and when possible visual sighting. He must then act logically, decisively and without delay, guided by the regulations set forth in appropriate documents which govern flights over USSR territory, and displaying courage, resourcefulness and tactical ability.

It goes without saying that only a disciplined aerial fighter, who has boundless love for his Homeland, knows his duty to his party and people, and is convinced that he is fighting for a just cause can cope with such a mission. Thus, constant readiness for battle presumes exceptionally high self-motivation and resolve to fight to the end and successfully accomplish the mission. Courage, decisiveness, restraint, operational daring, strength of will, offensive spirit, the ability when necessary to sacrifice himself in the name of victory over the enemy, ideological tempering and patriotism -- these qualities are fully manifested under the special conditions of an operational flight.

This incident occurred several years ago at one of the border regions of our country. Ground radar posts noticed the intrusion of an unidentified target into Soviet airspace. Immediately a fighter was scrambled, piloted by Captain G. Yelisseyev, deputy squadron commander for political affairs. The pilot proceeded to the area of the target at the command of an operations control officer. But at visual sighting distance the intruder noticed the interceptor, abruptly turned around and began to retreat toward the border. The aerial situation was unfavorable for our pilot. The enemy might get away unpunished. Captain Yelisseyev made a decision. Turning on his afterburner he approached the intruder aircraft at maximum speed and brought it down by ramming. At the cost of his life the Soviet pilot stopped an enemy provocation. This deed demonstrates convincingly that for our aerial warriors nothing is more sacred than their Homeland, for the sake of which they are capable of sacrificing their lives.

During the years of the Great Patriotic War, Soviet pilots accomplished hundreds of aerial ramming attacks in fierce battles with the fascist invaders. They did not always end successfully for our crews. However, the pilots

consciously took an extreme risk with confidence in the correctness of their decision, and dealt the enemy a deadly blow. Courageous people, brought up by the Communist Party in the spirit of filial love for their socialist Homeland, and utterly devoted to the great cause of communism acted in this way. The deed of Captain Yelisseyev, a loyal son of the party and people, was greatly appreciated by our country. He was posthumously awarded the title, Hero of the Soviet Union, by decree of the Presidium of the USSR Supreme Soviet. This ramming attack on a jet aircraft demonstrates that for Soviet pilots nothing stands in the way of achieving victory over the enemy.

Forming the best human traits and combat qualities in Soviet aviators is a complex, many-sided and lengthy process. It is tremendous, laborious work for commanders, political officers and party and komsomol organizations which foster a high degree of consciousness, discipline and performance in the troops, and a feeling of personal responsibility for their actions and for the fate of the Homeland. One can hardly expect such selfless actions from one who is undisciplined and inwardly disorganized. It is said that from discipline to heroism is a single step. Life demonstrates convincingly that these are not merely words. They contain truth repeatedly tested in fierce battles with the enemies of our Homeland. The Great Patriotic War gave us thousands and thousands of confirming examples. Various effective forms and methods of Soviet military pedagogy are used to inculcate discipline, responsibility, communist convictions and technical ability, and develop high professionalism. In this effort special attention is devoted to discipline. Without firm military discipline it is not possible to achieve high results in military work.

Command and political organs and all communists see it as their task in military training and party-political work to struggle resolutely against any negative phenomena, to maintain the demandingness of commanders at the prescribed level, and to create an environment of intolerance to specific violators of discipline. Public opinion has a special role here. Where a guilty party feels condemnation from his comrades and knows that under no circumstances will he escape responsibility before his commanders and coworkers, the atmosphere is better, and it is easier to serve and work. All of this directly concerns pilots, maintenance personnel, combat operations control officers and support unit specialists who are involved in operational watch duty.

One important element of the readiness of a pilot (crew) for combat, on which to a large extent the outcome of aerial combat depends, is his tactical training. Thorough mastery of his weapons and equipment, good aerial training, developed tactical thinking, and also knowledge of the enemy's tactics are reference points in the search for new combat techniques and in courageous and initiative-filled actions. It is doubtful that a pilot who does not know tactics would take decisive and strong-willed actions. As a rule a provocator who intentionally violates the USSR state border does not expect combat, tries to escape pursuit by highly-skilled maneuvering, and uses his weapons when necessary. Consequently the on-duty crew must be prepared for most unexpected changes and be able to guess in advance the enemy's plan. At times there is but one chance for success, especially in instances not foreseen by any instructions, and it is necessary to display the qualities of an analyst and make an

accurate decision which corresponds to the situation. Resourcefulness, the ability to guess the enemy's plan, combat daring and accurate firing -- this is the highest level of tactical skill.

An equally important element in combat readiness of the on-watch shift is the special preparedness and tactical maturity of combat operations control officers and aviation unit command posts. Controlling the actions of the airborne crew, they give the flight profile from the outset, dispatch the interceptor to the indicated locations, and in a tactically favorable situation even create for it the best conditions for employing the aircraft as a weapon of armed conflict. Here as well a feeling of responsibility for the outcome of the flight and the inviolability of our borders must be just as developed among combat operations control officers and other command post specialists as among the flight personnel.

The all-round preparation of the pilot for his combat watch duty is only part of the matter, although a very important part. As we know an airplane is a collective weapon. A large group of specialists of various types prepares it for flight. The reliability of the aviation equipment in the air depends on how well all systems and assemblies are readied and their efficiency checked. Moreover, the flight is supported by airfield service, radio and illumination maintenance and command post specialists with whom the pilot interacts. All these elements must function precisely and continuously. A hitch or interruption in one of these may negatively influence the outcome of the flight. In the final analysis the pilot embodies in his work the tremendous labor of a large collective, which relies upon him and expects precise and decisive actions from him. It goes without saying that the training of ground specialists for combat watch duty must be no less than that of the flight crews. Recognizing the responsibility placed on their shoulders, the specialists function quickly, dextrously and competently.

Speaking of training for combat watch duty, one also cannot avoid the question of the responsibility of those on whom depends the decision to scramble the crew and, if necessary, to open fire. During combat watch duty instances occur in which the situation demands immediate, decisive actions. It is important that the commander and senior commander not delay in making a decision, for every second is important in order not to let the enemy escape unpunished.

It need not be said that any commander and pilot must possess strength of will when accomplishing a combat mission. The harsh laws of combat demand from the commander tenacity, resolve to overcome the enemy, the ability to suppress his vacillation and uncertainty, and the ability to take the full responsibility for his decision. This means that the commander, senior commander and pilot as well must display creativity and innovativeness in seeking ways to achieve victory. The commander who possesses firm character and strong will, and is confident in the correctness of his decision, has the ability to carry out his decision. One who avoids responsibility and hides behind others does not have the moral right to lead a collective. Without doubt these qualities must be fostered daily, constantly, using all the resources, forms and methods of combat training and party-political work.



The aerial situation may be such that the pilot himself has to make the final decision. Let us say he has to force an intruder to land at the nearest airfield. Acting in strict accordance with established regulations, he must do everything necessary to make the intruder aircraft land. If the crew does not obey, he must take the necessary steps. Competent, independent actions are an important indicator of the combat maturity of the pilot.

In a difficult international environment, when fomenting war hysteria, perfidy and deceiving public opinion have become the norm in the policy of the U. S. and its NATO allies, anything can be expected from the nuclear adventurers. Under these conditions we aviators must observe the highest vigilance, strictly preserve military and state secrets, and be fully armed, in order to respond properly to any provocative acts of the enemy. An intruder who wittingly crosses the border of a sovereign socialist state for perfidious purposes must be punished as he deserves. It is namely for this purpose that combat watch duty is organized in Air Force units. The interests of the security of our Homeland and the other countries of the socialist community so demand.

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## FIGHTER SQUADRON BREAKS IN NEW PILOTS

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 1, Jan 84 (signed to press 2 Dec 83) pp 4-5

[Article, published under the heading "Be Alert, In a Continuous State of Combat Readiness," by Capt O. Podryadchikov: "Youth in the Squadron"]

[Text] Maj A. Lapayev, the squadron deputy commander, walked into the pre-flight briefing room. He had already been up several times that day, but he did not feel tired. He was in high spirits. Capt A. Safronov, party organization secretary, saw that the major wanted to share his thoughts.

"It looks like you are in high spirits, Anatoliy Aleksandrovich."

"You bet!" replied Lapayev. "I was just up with Lieutenant Muzyka. There is a heavy crosswind blowing today, but he kept it right on the numbers, greasing it right down the glideslope. The officers in this new bunch are quite capable!"

...Lieutenant Muzyka was about to go up on a check ride with an instructor.

"Just keep it calm," Lapayev advised the lieutenant as he climbed into the cockpit. "We have a solid overcast and limited visibility, so keep your eyes on the gauges."

The fighter taxied to the active. The pilot radioed to the tower that he was ready for takeoff.

"Cleared for takeoff," came the reply.

The afterburner flame lashed the concrete runway. The aircraft shot forward. Within minutes it broke out of the clouds, and the cockpit was flooded with sunlight. Below them a snow-white undercast stretched to the horizon in all directions.

Lieutenant Muzyka confidently flew the aircraft along the prescribed route. He hit his waypoints on the button. On the last segment he noted discrepancies in the RSNB [Local Radio Navigation System] readings -- bearing and distance were reading wrong. Without prompting by the instructor, the pilot shifted to the

backup instruments. Turning onto his final approach heading, he precisely maintained all parameters and did an excellent job of bringing the aircraft in. The instructor gave his subordinate a high mark on his performance.

It was not long ago that the most recent group of young pilots reported to their newly-assigned squadron. In very short order lieutenants P. Muzyka, S. Ivanov, S. Kislenko, and S. Skrypnik have achieved excellent results in combat training and are continuing to work hard on mastering the pilot's profession, deepening their knowledge and improving their skills.

Lieutenants' paths of progress.... How important it is to find among them one's own path, that sole one which will not only lead to the desired objective -- a high degree of pilot expertise, but will also open up new horizons. The rank of lieutenant is a point of reference, as it were, in the biography of an officer. Later, as he acquires experience, he will develop confidence in his own ability, he will have greater responsibility to the collective for his actions and deeds, and such qualities as dedication to the cause, boldness, and resoluteness will become strengthened in his character. Young officers will learn to work in such a manner that their word remains firm.

In Lt Col V. Baskakov's squadron they have a very serious attitude toward the professional development of the younger personnel and devote much attention to this. The subunit command authorities skillfully organize training, and party and Komsomol activists focus personnel toward intensive, painstaking work.

When the young pilots reported to their new squadron duty assignment, a discussion was held at a meeting of the party buro on how to break them in and familiarize them with their new job in a short period of time. The party members considered the fact that they would be flying the same fighter the officers had trained on at school. This meant that the lieutenants' training should be organized according to an advanced training program, with main emphasis placed on new training items. In particular, more time should be devoted to familiarization with the flight training area and study of aerodynamics and tactics. Engineers focused the lieutenants' attention on knowledgeable operation of aircraft equipment and procedures to follow in case of equipment failure or malfunction. In short, the young officers prepared for their examinations according to a well-conceived plan. Soon they passed the tests and were placed on an operational status.

The first dual flights showed that the young pilots with clearly-marked abilities were improving their flying skills more successfully. The people in the squadron kept a very close eye on them, but they did not always praise them for successful performance. Why was this? In the initial period of development a young pilot may overestimate his abilities and put on airs. If this happens, unpleasantnesses cannot be avoided. Such things have occurred in the past. The people in the subunit focused particular concern on those officers who were advancing slowly through the training program. They required more time for acquisition of the requisite skills, but they would gain a solid mastery of these skills.

The spotlight was on the young officers in the squadron. Experienced commanders found the way to approach each pilot, made every effort to support intelligent initiative, and sought to boost the lieutenants' job skills.

Many good things are said about Lieutenant Muzyka. He is hardworking, persistent in his study, modest, and honest. Once he was scheduled for a training session in the practice area. As always, this pilot prepared well for the session: he read through the appropriate procedural instructions and documents governing flight operations. He displayed thorough knowledge when he was readiness-tested.

On the day of the training flight Muzyka felt calm and confident. He reported reaching the practice area and proceeded to practice the maneuvers. He was over broken cloud cover, which largely obscured the ground and limited visual orientation. The pilot proceeded to execute maneuvers.... He concentrated his entire attention on precisely maintaining the specified parameters, and for a certain period of time forgot about maintaining his location in the practice area. He glanced downward -- he was unable to spot familiar landmarks through the few breaks in the clouds. The lieutenant became concerned. A glance at his instruments -- everything appeared to be in order. He looked groundward. There it was, the familiar configuration of the edge of a forest. He realized that the aircraft had wandered somewhat from the center of the practice area. He reported this fact to his flight commander upon landing.

"Good you noted the position drift," said Capt V. Shakhov. "One should more frequently check one's position in the practice area visually and by bearing."

This incident compelled the squadron authorities to make the necessary adjustments in the young pilot training plan. Instructors focused attention on developing skills in utilizing information from the instruments to determine the aircraft's location when the ground is obscured by clouds. As a result the lieutenants began performing with greater confidence in the air.

One thing is certain: if instructors and trainees pull in the same direction, the combat training objective is reached with the least expenditure of time and effort. But another thing is no less important: an innovative situation impels people to work persistently to improve their job skills. Here is an example.

Lt S. Kislenko was one of the first of the young officers to commence combat flight training. He worked hard, but nevertheless he experienced difficulties in the air. With the assistance of the tactical control officer, the pilot closed on the target and spotted it on his radar screen. Fighter and target were closing fast. Kislenko had to perform several operations in sequence with little time to spare. The young officer did not perform with absolute precision, and therefore was at minimum allowable range when he finally fired the missile.

Upon his return to the field, Kislenko candidly related the entire incident to his instructor and asked him to do additional work with him on aiming sequence procedures, suggesting to the command authorities, as it were, the idea of

bringing the young pilots' theoretical training closer to actual combat conditions. Of course the lieutenants were carrying a full training work load, both on the simulators and in the aircraft cockpit. Nevertheless practice on the ground did not generate that psychological tension which a pilot experiences in the air.

Having conferred with his deputies and the flight commanders, Lieutenant Colonel Baskakov decided to change a few things in pilot combat flying training methods. First they explained in detail to the lieutenants how to operate the sight when shifting from one type of weapon to another while simultaneously keeping an eye on the target. Then they practiced in the simulator and aircraft cockpit, under instructor supervision, with a rigid time limit, responding to a great many different scenario instructions. As a result they learned to perform with both awareness and automatism.

The development of young pilots is a complex and laborious process. Its effectiveness is determined by many factors, in particular by the diligence and zeal of the officers themselves, the commander's ability to organize his men's training, and his methods expertise. All instructors in the squadron are skilled officers. They are characterized by an inherent feeling for the new, dissatisfaction with achieved performance, and a strong desire to pass on their wealth of experience to the younger men.

At one time Capt V. Plechkin made a considerable effort to ensure that one of his subordinates, Lt V. Korshun, corrected his error of flaring too high on landing. The flight commander noted that on approaching the ground the pilot would begin pulling back on the controls prematurely, and this naturally resulted in flaring the aircraft too high. After the landing, the instructor analyzed the flight with the young officer and asked him to show where he looked during roundout. Korshun pointed out correctly. The instructor's experience and feeling told him, however, that something was wrong here. It was subsequently ascertained that on approaching the ground, the pilot was incorrectly determining the height at which to initiate roundout. After practice sessions on the ground, the flight commander demonstrated in the air how to do it. Gradually Lieutenant Korshun corrected his error.

Here is another example. Once Lt A. Telegin touched down with an excessively nose-high attitude. The next time up he did the same. Capt S. Tsygankov went up with the lieutenant several times in a dual trainer and discovered the reason for the error: the pilot was not paying close attention to the airspeed indicator and was doing a poor job of maintaining the correct glide path.

The flight commander first worked with Telegin on the simulator, teaching him to distribute his attention correctly and properly to monitor the gauges. Subsequently working in the aircraft cockpit, he helped Telegin work on correctly directing his gaze during roundout. The instructor's painstaking work and the pilot's strong desire to correct his mistake led to success. Now Lieutenant Telegin receives nothing but high marks on his training flights.

The squadron's young pilots are continuing to work hard to improve their professional skills. Lt Col V. Baskakov watches closely to ensure that the combat pilots are constantly improving their military and specialized knowledge



and strengthening their moral-psychological conditioning. The experience and know-how of the finest officers is constantly being synthesized and disseminated in the subunit. The lieutenants are learning, and the instructors are learning as well. And this interdependent process makes a lot of sense -- the pilots' professional expertise is growing, and consequently their combat readiness as well.

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## SUCCESSFUL RECONNAISSANCE PILOT ABILITIES ANALYZED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 1, Jan 84 (signed to press 2 Dec 83) pp 6-7

[Article, published under the heading "Be Alert, In a Continuous State of Combat Readiness," by Honored Military Pilot USSR Maj Gen Avn V. Vasil'yev: "By Instruments and Visually"]

[Text] The history of aviation attests to the fact that combat utilization of aircraft began with their employment primarily for reconnaissance. Reconnaissance aviation formed as an independent branch of military aviation during the years of World War I, becoming one of the principal means of collecting intelligence on the deployment of enemy forces and the enemy's tactical order of battle, reserves and military installations at tactical and operational depth.

The experience of the Great Patriotic War as well as that of local conflicts, which are regularly discussed on the pages of the foreign press, indicates that ground forces operations and independent air operations are not conducted without prior organized air reconnaissance. During the years of World War II reconnaissance pilots obtained for the most part visual and photointelligence. Subsequently aircraft began to be equipped with various electronic systems, which made it possible to broaden the range of aerial reconnaissance missions.

Visual observation, however, in spite of certain drawbacks, continues to be a traditional mode of gathering intelligence. Its principal advantage lies in the fact that any aircrew on board any aircraft, unequipped with special gear, can conduct visual search and immediately transmit obtained information to the ground. Unquestionably the success of air reconnaissance depends entirely on the proficiency of the pilot (crew). Flight personnel authorized to fly a reconnaissance mission should be thoroughly trained to fly in IFR weather, day or night, at weather minimums, and should possess solid skills in visual orientation, search, recognition and determination of the coordinates of detected installations from all altitudes, especially during low-level and extremely low-level flight.

Determination of coordinates is the final stage of visual search. It is accomplished by two methods: visual position determination by an object's position in relation to points of reference, and on desert terrain -- by backplotting to a landmark. Distance between object and landmarks is determined by figuring



commensurate proportional segments on the terrain and transferring them to a map. Combining detailed visual orientation and search into a unified process is the foundation for rapid and accurate determination of coordinates. Its accuracy is affected by the peculiarities of the topography and presence of easily recognizable landmarks, map scale, time available to the pilots who are tying an object in to the terrain, as well as the aircraft's altitude.

As we know, basically three factors affect reliability of data on a target: inaccurate determination of a target's location on the terrain, errors in transferring its location point onto a map, and incorrect figuring of coordinates from the map. As practical experience indicates, however, the first factor is the main one, and therefore the crews of reconnaissance aircraft are constantly looking for the most effective reconnaissance techniques, which eliminate departure from reliable data. For example, specialists from one squadron suggested determining coordinates from a range line on two landmarks passing through the object. Its position is determined by the ratio of distances from one landmark to the object and from the object to the other landmark (let us say, for example, that it is 1:3). These numbers are memorized, and the object's location point and its coordinates are determined on the map from these figures. This method makes it possible to determine an object's coordinates with minimum aircraft time over the target.

Another method consists in determining an object's coordinates relative to a linear landmark, that is, the target's position is determined with the aid of a perpendicular line run from the object to a linear reference. The length of the perpendicular line and its point of intersection with the linear reference are entered on the map, and then the object's coordinates are determined from its location point on the map. With this method accuracy will depend on determination of the point of intersection of the linear reference by the perpendicular line.

The magnitudes of the second and third errors can be reduced by regular practice in determining and figuring the coordinates of any given points indicated on aeronautical charts. The larger the scale of the map, the smaller the error in determining coordinates.

Learning visual search is a difficult and laborious process. Crew members of a reconnaissance aircraft should learn quickly to spot a target, to determine on the basis of characteristic features its type, status, capability to operate, to note down its exact location on the map in relation to reference landmarks, to determine coordinates, to encode a radio message and transmit it to the ground. In flight an aircrew must within a few seconds analyze a large volume of visual information and generate a final result in the form of a report. This imposes considerable moral-psychological stress on aircrews. Technical and electronic devices, which reduce aircrew work volume on determining the coordinates of targets, encoding and transmitting information, reduce these stresses.

As a rule pilots who are assigned to reconnaissance immediately upon completing school acquire the most stable skills in performing reconnaissance missions. From the very beginning of their flight activities they develop a certain moral-psychological attitude and corresponding professional skills. And they

successfully accomplish the assigned task. The situation is worse with pilots assigned to reconnaissance aviation from other branches. They experience more difficulty in mastering their new job. As for reconnaissance pilots who are transferred to other branches of aviation, they usually rapidly master the new training activities. This indicates that attention, memory, and the ability rapidly to evaluate a situation and to process an enormous volume of visual information are more highly developed in a reconnaissance pilot. They also help him rapidly master complex and totally new training activities.

In connection with equipping aircraft with navigation systems, some commanders, in the process of training, at times forget that the crew of a reconnaissance aircraft should have the ability to perform detailed visual orientation from takeoff to landing. Without this it is very difficult to accomplish reconnaissance missions. Navigation systems only help an aircrew determine an aircraft's position, but in no way eliminate the need for visual orientation.

The integral linkage between visual observation and detailed orientation is possible only with thorough preparation for a mission. A pilot must not only thoroughly study the target area and route of flight, but must also have precise knowledge of the topography of the terrain over which he will be flying, be familiar with climatic conditions, and with weather on the day of the mission and for the preceding 3 to 5 days. Only then can one determine in advance the points of most probable location of military vehicles and installations and eliminate from the search area those areas in which, based on the given conditions, reconnaissance targets could not be deployed. I shall cite an example.

Carrying out a mission to reconnoiter "aggressor" nuclear missile forces, Capt Yu. Mikhaylin spotted 8 out of 10 targets. Accuracy of determining coordinates ran several tens of meters, while time in the reconnaissance area did not exceed 5 minutes. There is no particular secret involved. The fact is that there had been heavy rains on the previous day. Studying the reconnaissance area and the situation, the pilot noted the most probable deployment locations and possible routes of target movement, taking into account their cross-country movement capability and the condition of the roads. He plotted a route line across them, which he divided into 30-second segments for conducting detailed orientation. It turned out that 8 of the 10 targets were close to the points placed on the map. Thorough preparation for the mission, a correct evaluation of the terrain, and analysis of weather conditions enabled Captain Mikhaylin to do a fine job of accomplishing the assigned mission.

Knowledge of indirect telltale signs, as well as intuition help aircrews successfully perform visual aerial reconnaissance. We shall state frankly that, operating in identical conditions in performing visual search, every pilot operates in his own unique way.

At a tactical air exercise a reconnaissance subunit was assigned the mission of spotting an "aggressor" tank force concentrated and concealed in a forest. Two aircrews failed to spot the tanks.

Flight commander V. Bashkov took off on a search mission. Upon approaching the reconnaissance area he changed altitude briefly, assessed the terrain, and

realized that there could be no tanks there: that area of forest was too unsuitable for concealment, and the approaches were also poor. A sixth sense told Bashkov that he should look for them in another tract of forest, in a grid square not designated for reconnaissance. The pilot decided to check out his hunch. As he was flying over a clearcut, he spotted "aggressor" soldiers. Dropping in altitude, he made a second pass and spotted the concealed tanks. This location was 6 kilometers from the targeted grid square. As we see, intuition helped Captain Bashkov accomplish his mission.

Search for and identification of targets as well as determination of their coordinates become considerably more difficult with increased aircraft speeds. In training reconnaissance pilots it is essential to make intensive use of simulator equipment, visual aids, and films taken at exercises. In order to utilize that which is incorporated into an aircraft system by those who designed it, a pilot needs solid knowledge of theory, the ability clearly to grasp and comprehend the physical processes which take place during flight, as well as professional skills. Only by knowing his aircraft thoroughly, by possessing a total mastery of it, is he able to spend most of the time observing the ground and air, which unquestionably has a positive effect on quality of mission performance. In other words, every sortie should be preceded by thorough aircrew preparation on the ground, innovative analysis of the possible situation, and forecasting of the tactical situation. Then every air mission will be performed well.

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## WEST BLAMED FOR DANGER OF WAR

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 1, Jan 84 (signed to press 2 Dec 83) pp 8-9

[Article, published under the heading "26th CPSU Congress: Problems of Theory and Practice," by Candidate of Philosophical Sciences Lt Col E. Korsakov: "A Policy of Peace Against Military Confrontation"]

[Text] The time which has passed since the 26th CPSU Congress has confirmed the correctness of the party's conclusion that the confrontation between two courses of policy in world politics is becoming increasingly more acute in the international arena. CPSU Central Committee General Secretary Comrade Yu. V. Andropov noted in his speech at the June (1983) CPSU Central Committee Plenum: "There has occurred an unprecedented aggravation of the struggle between the two world societal systems."

Reactionary circles, which determine the foreign policy of the United States and the other imperialist countries, supported by aggressive military blocs, are endeavoring to pursue a militant, great-power course of policy and are heating up the international situation to a dangerous level. At the same time bourgeois politicians and ideologues are attempting to convince the world community and the peoples of their own countries of the alleged aggressiveness of the USSR and are making every effort to propagate the myth about a "Soviet military threat." The purpose of these fabrications is to justify the arms race which has been unleashed by the militarists.

The international activities and foreign policy of the Soviet Union and the brother socialist countries proceed in a totally different direction. These countries are concentrating their efforts primarily on preserving and strengthening peace and oppose military confrontation and heightened danger of a nuclear missile war. "Today there is no more important task at the international level for our party, our people, and for all the peoples of the world than to defend peace," it was stated at the 26th CPSU Congress.



In the final analysis international relations are formed of the aggregate of foreign policy activities of countries and peoples. Foreign policy expresses first and foremost the interests of the ruling classes and constitutes a continuation of their domestic policy in the international arena. The foreign policy of the worker class of the socialist countries differs radically and fundamentally from the foreign policy of the bourgeoisie and of exploiter classes in general. "To egg peoples on against one another, to utilize one people to oppress another, in order in this manner to prolong the existence of absolute rule -- this is what the art and activities of all rulers and their diplomats who have existed up to the present time have boiled down to," wrote F. Engels about the foreign policy of bourgeois nations. Inequality, interference in the internal affairs of other countries, violence, and expansion are indeed typical of the imperialist principles of international relations.

Socialism advances qualitatively different, Leninist principles of peaceful coexistence of nations belonging to different social systems. The aim of our foreign policy is to ensure, together with the other socialist countries, favorable international conditions for building socialism and communism. This goal is formally stated in the USSR Constitution and in the constitutions of the other socialist countries.

The foreign policy of the Soviet Union and the other nations of the world socialist system preserves in full measure the Leninist features which are inherent in it -- a class nature and internationalism, a democratic spirit and humanism, love of peace and historical optimism, and faith in the possibility of preserving peace and preventing another world war. It is directed toward normalization of the international situation, lessening the threat of a world war, and excluding from international relations the practice of meddling in the internal affairs of other countries, and prevention of utilization of economic, political, and military dictate by imperialism in order to hold back the anti-imperialist struggle. The CPSU Central Committee decree entitled "80th Anniversary of the Second Congress of the Russian Social Democratic Workers' Party" stresses that the CPSU, guided by the Leninist principle of peaceful coexistence between countries with differing social systems, is working consistently and persistently to preserve and strengthen peace. The Peace Program for the 1980's, adopted at the 26th CPSU Congress, points out a realistic, practical way to save mankind from the threat of thermonuclear war and free it from the burden of an arms race.

The foreign-policy initiatives of the 26th CPSU Congress provided a powerful stimulus for intensifying the activities of peace-seeking forces throughout the world. It was noted in the congress proceedings that the aggressiveness of the policy of imperialism has increased sharply at the junction of the 1970's and 1980's. The danger of another war is real indeed.

The decisions and actions of reactionary imperialist forces and their accomplices have evolved into an entire "doctrine" and undisguised actions opposing détente. These include basing policy on a lasting, escalating arms race, impeding arms negotiations, undermining the established world military balance, and rejection of the principle of equality and equal security. This is a policy

of confrontation with the socialist nations, a policy of undisguised intervention, including military, in the affairs of other countries and peoples in the interests of monopolies, for the purpose of establishing the domination of imperialism, primarily U.S. imperialism, over many countries and regions of the world. This is eloquently attested by the U.S. aggression against Grenada and preparations for military intervention in other sovereign countries.

The United States has established "rapid deployment forces," for example, for direct military intervention primarily in the Near and Middle East. Their total numerical strength is specified at 200,000 regular troops and 100,000 reservists. In particular, more than 700 tactical aircraft, as well as strategic bombers, tanker aircraft, reconnaissance aircraft, and AWACS aircraft have been dedicated to the RDF from the Air Force, as well as three carrier battle groups, a surface combatant group, and five squadrons of combat patrol aircraft.

Behind the decrepit myth about a "Soviet military threat," behind the lying, demagogic arguments by the U.S. Government that an increase in U.S. military might allegedly furthers the cause of peace stands an attempt to tip the balance of military-strategic parity, to gain military superiority over the USSR and the other nations of the socialist community both in nuclear and conventional arms, and to deprive them of the capability to deliver a retaliatory strike in case of nuclear aggression.

Our country has been doing and is continuing to do everything it can to maintain the established parity, to preserve at all costs the principle of equality and equal security, which has been established over the span of many years. This was clearly reaffirmed by Comrade Yu. V. Andropov at the June (1983) CPSU Central Committee Plenum and in his Declaration in November of last year.

U.S. policy aims at demolishing this principle. This is indicated, for example, by the decision made by the United States and NATO to commence deploying new U.S. intermediate-range nuclear missiles in the countries of Western Europe, as well as the "strategic program" for the 1980's announced by the U.S. President, a program which incorporates a policy of further increasing strategic nuclear potential. In addition to buildup of various types of arms it specifies, as is attested by the foreign press, arming not only B-52 bombers with cruise missiles of a new type, as was previously planned, but also B-52H bombers as well, which total more than 250 aircraft. Previously rejected plans to build the B-1 bomber have been revived, but on a qualitatively new level. The B-1B cruise missile platform has been developed, based on the B-1, and in the near future will become operational in the strategic air arsenal.

According to the foreign press, scheduled simultaneously with the above is the development of the fundamentally new Stealth strategic bomber which, according to the Pentagon, modern air defense hardware will be unable to detect. Plans call for building 150 of these aircraft in the 1990's, as a replacement for the B-52 and to supplement the improved B-1B.

Also attesting to an endeavor to topple the strategic balance of forces is the content of a report by the Pentagon and U.S. National Security Council, pub-

lished at the beginning of 1983, which clearly orients U.S. armed forces toward delivery of a nuclear first strike on targets in the USSR and the other Warsaw Pact countries.

The Soviet Union will never permit this, will never allow itself to be defenseless in the face of a military threat. This was clearly and resolutely stated by CPSU Central Committee General Secretary Comrade U.V. Andropov in replies to questions put by a PRAVDA correspondent and in replies to the magazine DER SPIEGEL (FRG). He exposed the unscrupulous devices to which the present Washington Administration is resorting, attempting to distort Soviet policy and justify development of additional new variations of nuclear war. This reckless course of policy, he noted, is grounded on militant, fanatic anticommunism.

Statements by the U.S. President and the recently-concocted second edition of the Pentagon pamphlet entitled "Soviet Military Power," which contain mountains of lies and juggling of the facts about Soviet military policy, deliberate distortion of the actual ratio of arms between the USSR and the United States and, of course, deliberate failure to say anything about Washington's dangerous schemes, serve as the most graphic examples of attempts to profit on the myth about a "Soviet military threat."

Recently the Soviet Union and other socialist countries have come forth with a number of new and important constructive proposals. They are set forth in the Declaration by CPSU Central Committee General Secretary Yu. V. Andropov, chairman of the Presidium of the USSR Supreme Soviet, in the Political Declaration adopted at a meeting of the Political Consultative Committee of the Warsaw Pact member nations, and in other CPSU and Soviet Government documents. These proposals represent a realistic alternative to the policy of arms buildup pursued by the United States and its allies, a policy aimed at preparing for war. The USSR and the other nations of the socialist community unwaveringly advocate maintaining existing and entering into new international agreements leading to normalization of the international situation, preservation and strengthening of détente. While some politicians in the West claim that the 1970's, which were marked by détente, were a random episode in the difficult history of mankind, it is a deep conviction of the CPSU and Soviet Government that the policy of détente is by no means past history, that the future belongs to détente.

The Soviet Union has unilaterally pledged not to be the first to employ nuclear weapons and calls upon the other nuclear powers to follow its example. Jointly with the Warsaw Pact nations, the Soviet Union proposes to the NATO member nations that all parties enter into a treaty containing a mutual pledge not to employ military force and to maintain peaceful relations. Statements by our party and government declare that we are ready and willing at any time to resolve on a mutual basis the question of freezing the Soviet and U.S. nuclear arsenals. We are in favor of rapid and successful completion of talks on nuclear arms in Europe and on strategic arms limitation and reduction. We have the opportunity and possibility to find a solution; there is only one thing lacking -- a sincere desire by the United States to reach a just and fair agreement. The "alternative solutions" advanced by the U.S. President are aimed at deceiving the public, at neutralizing the growing wave of mass



antimissile sentiment, at demonstrating to the NATO allies an alleged U.S. negotiating "flexibility," while accusing the Soviet Union of "intransigence," as the Soviet Union cannot and will not ever agree to proposals which upset military-strategic parity and the principle of equal security, and on this basis deploying new U.S. missiles in Western Europe. In response to a direct military threat, the Soviet Union has been forced to take additional measures to guarantee both its own security and that of its Warsaw Pact allies.

Our country favors reaching an immediate agreement on a total and universal ban against testing of nuclear weapons, in order that new types and kinds of nuclear weapons can no longer be developed, and it is for the banning and destruction of chemical weapons, and for the creation of nuclear-free zones in various parts of the world.

In 1981 the Soviet Union introduced a proposal at the United Nations to commence talks on banning all weapons from space. The United States, however, did not respond favorably and is continuing the militarization of space. The USSR and the other socialist countries are ready and willing to consider any constructive proposals aimed at resolving the major international problems in conformity with the principle of equality and equal security. Effective solidarity with countries and peoples which are defending their independence has been and continues to be a fundamental principle of Soviet foreign policy.

Thus the USSR and the other nations of the socialist community, true to the Leninist policy of peace, are doing everything they can to avert the threat of war, to defend and strengthen peace.

Today a special role in defending peace is played by world socialism and the international Communist, worker, and national liberation movements. The might and solidarity, unity and aggressiveness of these forces, as well as strengthening of the mass movement for peace and against the unleashing of another world war constitute a guarantee of the preservation of peace and elimination of the threat of another world war.

An analysis of the present world military-political situation indicates that socialism and peace are inseparable, while imperialism has been and continues to be a source of military danger, military conflicts, and wars. And as long as such a threat exists, the USSR and the other nations of the socialist community will increase the combat power and combat readiness of the Joint Armed Forces of the Warsaw Pact member nations. "...The military-political defensive alliance of the socialist countries faithfully serves the cause of peace," states the Accountability Report of the CPSU Central Committee to the 26th CPSU Congress. "It possesses everything it needs in order reliably to defend the socialist achievements of peoples. And we shall continue in the future doing everything to ensure that it continues to be so in the future!"

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## POLITICAL OFFICER REVIEWS POLITICAL EDUCATION DAY

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[Article, published under the heading "Ideological Work to the Level of the Demands of the June (1983) CPSU Central Committee Plenum," by Capt V. Zdanyuk: "Do Not Leave Without a Response"]

[Text] "Our party's policy is clear, and we are ready and willing to respond to any questions which arise with Soviet citizens."

From the CPSU Central Committee  
Accountability Report to the 26th  
CPSU Congress

A unified political education day was being held at the aviation garrison.... A great many political indoctrination activities were being conducted. Leader-Communists were also devoting time to receiving personnel with personal questions. At such times people approach their older comrades with their thoughts and feelings, confiding both their joys and sorrows. They do this knowing that they will be met with understanding and support and will receive a reply to any question.

Officer Yevgeniy Ivanovich Kopyshchev leaned back in his chair and put down his pencil. It looked like he would have no more visitors today. The last one had just left his office.

But his work was not yet over. The political agency chief took a pen and notebook. He had to give some thought to how better to handle the matters which had been brought to him and to determine which officer-leaders to give assignments on the following day. And there were a great many matters to settle. Unified political education days are becoming increasingly more popular with aviation personnel, and their effectiveness is growing. People wait impatiently for the next unified political education day, in order to meet with command authorities and settle pressing matters, to obtain clarification on everything of interest to them. A mutual enrichment takes place, as it were. On the one hand leader-Communists, when speaking to a group, learn their needs and aspirations. On the other hand the men and members of their families, conferring with their senior comrades, are able promptly to resolve pressing problems.

The political worker leisurely read through his notes, made additional notes in the margins, and jotted a few things down in his personal notebook. Behind each line stood people, with their thoughts and aspirations, their concern for the common cause, and sometimes their own personal emotional experiences and hopes for aid and advice.

...Today WO A. Radul was the first to come to his office. Officer Kopyshchev knew him well. An activist party member of high principles, a knowledgeable specialist, a genuine expert at his job. Such people do not come on trivial matters.

"Take a chair," the political agency chief invited his visitor after replying to his greeting and added with a smile: "What can I do for you?"

He was right. The warrant officer had come to this leader-Communist on a far from personal matter. At the report and election meeting the party members of the maintenance group elected him party group organizer. His comrades' trust and confidence had buoyed his spirits and infused him with energy. Anatoliy had set about his new task with his characteristic diligence and initiative. He was filled with innovative ideas and drew up a plan for increasing the effectiveness of intraparty work within the group. He then learned that the command authorities had decided to transfer him to an equivalent position in another subunit. It is difficult to say what prompted this decision -- the needs of the service, or something else. One thing was clear: the party group was being left without a leader, an activist Communist.

After hearing the warrant officer out, Kopyshchev asked: "Anatoliy Petrovich, have you gone to see any of the political workers?"

"I have. They told me that the decision was necessary."

The political agency chief picked up the telephone, spoke with the appropriate officials, and asked them to consider Radul's civic work contribution in deciding whether or not to transfer him. The matter was settled within minutes. Yevgeniy Ivanovich said in parting: "I am glad that you are so enthusiastic about your work. I wish you success."

Radul left, but the political worker continued to think about their conversation. Why could the people in the subunit not settle a simple matter on their own? It had not been out of personal considerations that the warrant officer had requested to remain in his current assignment. He had been proceeding from the interests of the collective, the party group which he had been entrusted to lead. A new entry appeared in Kopyshchev's working notebook: "An instructor should do some work in the unit."

This is a principle Yevgeniy Ivanovich follows in his work: finish every job that has been started, especially if it involves people. Kopyshchev recalled the last occasion when, on a unified political education day, he had been visited by a lieutenant who had recently been appointed to the position of tactical control officer. Speaking on behalf of his comrades, he had requested assistance in improving conditions in their quarters. The dormitory building needed repairs, the electrical outlets did not work in many of the rooms, and frequently there was no hot water....

"We have done everything possible with our own resources," the lieutenant stated heatedly. "We have repeatedly requested allocation of materials to continue the job. But we get nothing but promises."

Yevgeniy Ivanovich thereupon did everything he could to ensure that problems connected with the living quarters and off-duty activities of the unit's young officers were quickly resolved. The political worker knew very well that these were not trivial matters. How well an aviator has been able to rest, as well as the thoughts and mood he brings with him when he reports for duty determine in the final analysis the state of the combat readiness of the sub-unit and unit and improvement in job skills. And of course all this affects the morale of any military collective.

Severe measures had to be taken, it is true. He sternly reprimanded those leader-Communists responsible for this area, and these officials immediately scheduled repairs. Officer Kopyshchev kept a close eye on progress. A week later he visited the dormitory, spoke with the young officers, and was told that conditions in the lieutenants' quarters had been brought into conformity with guideline documents.

The political worker returned to today's events. It had also been possible to resolve quickly and affirmatively the matter which Pvt M. Mamadaliyev had brought. He was then visited by women involved in amateur talent activities. They were planning a holiday concert program and had decided to make some nice, attractive costumes. But the PX did not have the material they needed. Yevgeniy Ivanovich promised to help the women, and he jotted down in his notebook: "See supervisors at trade and personal services enterprise...."

We should note that the matters which people bring to leader-Communists on unified political education days are quite diverse both in nature and significance. They are linked, however, by concern for the general welfare. For example, many officers, warrant officers, enlisted personnel, and members of the families of servicemen bring personal matters for the most part. But a closer scrutiny reveals that these matters are evoked by concern for improving the training process, boosting the level of political indoctrination work, and improving aviation personnel living conditions and off-duty activities. The personal here is inseparable from the element of public good.

Leafing through his notebook, officer Kopyshchev stopped at every line. A young warrant officer was having problems with his family life.... A pilot's wife, a mother of two, wanted help in getting her younger son placed in kindergarten.... A daughter had been born in an officer's family, and it was necessary to improve their housing conditions.... Here was another entry. L. Rzheshnivetskaya requested help in finding a job. This young woman had recently graduated with distinction from the Lvov State Conservatory. Who was better suited than she to teach children at music school, to instill in them a feeling for the beautiful?

Finishing his work, Yevgeniy Ivanovich summoned the duty man. He gave brief instructions: "Please inform all commanders and political workers: tomorrow there will be a meeting to discuss the results of today's political education day. People expect a response from us...."

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## POLITICAL WORKERS AID SQUADRON FLIGHT OPERATIONS

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[Article, published under the heading "From Party-Political Work Experience," by Maj B. Makarevich: "Exerting Continuous, Effective Influence...."]

[Text] On the eve of a day of flight operations, preliminary preparation was, as customary, being conducted in the squadron. Aviation engineer service specialists were carefully inspecting the aircraft and performing the necessary procedures. Pilots were busy preparing for the day's flight assignments in accordance with the planned schedule. Some of them would be making intercepts of air targets for the first time, while others would be brushing up flying skills.

Squadron deputy commander for political affairs officer G. Pasharin had endeavored to consider all the specific features of the schedule in planning party-political work for the flight operations shift. On the preliminary preparations day he gathered together party and Komsomol activists for a briefing session and gave each a specific assignment.

Pasharin's own preliminary preparation proceeded along two lines, as it were. Together with the combat pilots he worked out in detail those maneuvers which were to be performed during the forthcoming flight operations shift. He also laid down a solid foundation for the conduct of effective party-political work.

Officer Pasharin handles his duties well. It is true that at first things did not go entirely smoothly for this young political worker. No matter how hard he tried to schedule his work, there was not enough time for many things. He found himself unwittingly proceeding in some haste, and he was somewhat nervous. This did not help things at all.

The political officer's initial difficulties were not unnoticed. Older comrades, leader-Communists, came to his aid. By personal example and advice they helped Pasharin choose the correct work style and learn to see in all things the main element, and counseled him to plan and schedule party-political work taking into consideration the specific tasks being performed by the squadron. The officer learned many useful things by studying the proceedings of the 26th CPSU Congress, the CPSU Central Committee decree entitled "Further Improving

Ideological and Political Indoctrination Work," and the June (1983) CPSU Central Committee Plenum, and the recommendations of the Sixth Armed Forces Conference of Primary Party Organization Secretaries. For example, he noted for himself the need to rely more on the party and Komsomol activists, to boost the significance of personal example by party members, to enhance the organizational role of party influence in the collective, plus many other things which he adopted as guidance in his activities.

On the eve of the flight operations shift in question, Pasharin assigned a task to activists, taking into consideration both the specific features of the forthcoming flight operations and the level of proficiency of his assistants. This political worker had become convinced through his own experience that the interests of combat training and flight operations safety demand not general words and not political agitation for accomplishing successful flight operations in general, but rather well thought-out, purposeful work in the most diversified areas on which the success of the common cause depends.

He instructed experienced combat pilot Maj V. Obramovskiy to work with young lieutenants S. Marinich and A. Filimonikhin and to remind them once more how they should distribute their attention in executing an intercept in its various phases, since they had been experiencing difficulty precisely in this. Capt Tech Serv V. Stepanenko was given the task of devoting particular attention to checking to ensure that aircraft were fueled in conformity with the scheduled exercise and observance of prescribed safety procedures in handling armament. This is very important, because the ground crewmen included younger, less experienced personnel. Officer S. Moiseyev was assigned responsibility for delivering the latest issues of newspapers and magazines to the field. He was also responsible, together with Komsomol committee member officer N. Tomashevich, for putting out a radio newspaper and news bulletin leaflets. The political worker assigned officer A. Chernyshev the job of monitoring to ensure prompt delivery of meals to the airfield and organization of personnel off-duty time. The other activists were also given specific assignments. Thus following the briefing session each one was fully informed on what he would be handling during the flight operations in addition to his specific job duties.

At the next morning's briefing aviation personnel obtained a situation updating and then proceeded to their aircraft. While the pilots were practicing procedures in their aircraft cockpits, Major Obramovskiy approached officer Filimonikhin. For some time he closely observed his actions and satisfied himself that the pilot's psychological frame of mind was good and that he was performing cockpit procedures with precision and confidence. When the pilot completed the practice session, Obramovskiy discussed with him the sequence and specific features of making intercepts, recalled several incidents from his own practical experience, and gave him a few tips on how to achieve success.

Exchanging experience and know-how and assisting young pilots is a delicate matter, for sometimes even job-related advice must be presented in such a manner as not to hurt the pride of a fellow serviceman. A didactic tone of voice and haughtiness are intolerable. On the contrary, easy, unconstrained conversation and friendly advice, which raise one's spirits and give confidence of success, are always necessary.

The squadron commander and political worker took all this into consideration when they were deciding whom to assign the job of monitoring the training of the young pilots. Major Obramovskiy is a capable methods specialist, and he is highly respected in the subunit. He has the ability to find the correct tone of voice, and his comments are specific and businesslike. Checking the preparation of officers Marinich and Filimonikhin, for example, Major Obramovskiy was generally satisfied, but he advised them to go through once again certain elements of the forthcoming training sortie and gave advice on how to distribute their attention during the target intercept. The young pilots in turn asked several questions and became clear on certain details.

Soon A. Filimonikhin took off on his training sortie. He performed with precision and executed precisely the commands received from his ground control.

The interceptor, on an intersecting course, rapidly closed on the target. At a certain moment the target blip appeared on the radar sight screen. Now came the attack -- the moment of greatest stress and intensity of all energies. This requires will, composure, fast reaction speed, and precision flying technique. The slightest mistake can result in undesirable consequences, and in combat can end in tragedy. The young officer performed flawlessly. His attack was sure. Having fired his ordnance and breaking away, he headed for home.

S. Marinich also successfully accomplished his intercept.

In the meantime Komsomol activists, led by officer N. Tomashevich, visited the flight operations officer and senior flight operations engineer and determined what marks the young officers had received on their intercepts and how well the technicians and mechanics had readied the combat aircraft for flight operations. Soon they displayed at a prominent location a flash news bulletin reporting the skilled intercept performance by S. Marinich and A. Filimonikhin. A little later a radio newspaper was broadcast over the public address system. The broadcast reported about the combat pilots who had distinguished themselves, and about those personnel who had contributed to the successful combat sorties with performance on the ground -- aviation engineer service specialists A. Leont'yev, A. Karnovich, and others. The announcer stressed that results could be fully summed up only after completion of the flight operations shift. Consequently aviation personnel must continue rigorously observing the requirements of guideline documents, guaranteeing accident-free flight operations, working persistently to improve air proficiency and to increase their professional vigilance.

Otherwise it sometimes happens that, in performing various operations on aircraft equipment, bringing aircraft in and out, people become habituated to their daily job duties and consider them routine, imposing less demandingness on themselves. It is therefore very important to maintain in personnel a constant businesslike activeness, to develop vigilance and technical circumspection.

Squadron political worker officer Pasharin took pains to ensure that the latest issues of newspapers were delivered to the airfield. Aviation personnel



learned from the newspapers about the achievements of our country's working people and read reports from "hot spots" throughout the world. This heightened their feeling of responsibility and aroused in them the need to work better, to make their contribution toward increasing the subunit's combat readiness.

...Another day of flight operations had come to an end. The squadron commander noted at the debriefing and critique session that the subunit's personnel had accomplished the tasks assigned to the flight operations shift. He named the socialist competition winners, officers V. Yashkin and A. Leont'yev. The commanding officer also noted deficiencies. In particular, publicity of competition among aviation engineer service specialists was poorly handled. Party and Komsomol activists still have a great deal to accomplish in this area. On the whole, however, they did a good job that flight operations day and contributed greatly to the success of the entire squadron.

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## PSYCHOLOGICAL APPROACH TO YOUNG PILOTS CONSIDERED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 1, Jan 84 (signed to press 2 Dec 83) pp 12-13

[Article, published under the heading "Flying and Psychology," by Doctor of Medical Sciences and Professor Lt Gen Med Serv N. Rudnyy: "New Men in the Regiment"]

[Text] The first year of service in a regiment has a special place in a pilot's life. He long remembers his first meeting with his new commanding officer, his first takeoffs and landings, his flights in the practice area and to the range. It sometimes happens that this year brings a young pilot not only joy but grief as well. Who is to blame for this: he himself, or perhaps the commanding officer, or his comrades? How does one explain a long, dragged-out process of becoming broken in as a pilot, and how does one explain mistakes made on the job?

...Aleksey Postnov began his service in a line regiment at the front. He was given a patched-together obsolete-model fighter. It got little performance out of its worn-out engine. Nevertheless, one could go into battle flying this aircraft. due to its slow speed, however, Aleksey frequently fell behind his comrades and was last to reach the combat destination. Messerschmitts frequently went for him, and his fellow pilots often had to come to the rescue of this young flier.

The lieutenant did not complain about his difficulties. He realized that one must earn the right to fly a new, fast fighter. In order not to fall behind his comrades, he requested permission from his commanding officer to take off first.

Postnov's fighter regiment was based at a field airstrip. Aleksey's very first takeoff from this strip ended badly. During his takeoff roll, his aircraft took a slight leap across an irregularity on the airstrip, and the pilot, interpreting this as liftoff, retracted his gear. The fighter plopped onto the ground and slid a good dozen meters on its fuselage. The propeller and gear fairings were damaged.

Maintenance personnel repaired the damage and put the fighter back into service that same day. But the pilot's chance mistake was assessed as cowardice, as

deliberately wrecking the aircraft. Postnov was threatened with severe punishment. He was a new man in the regiment, and there was nobody to stand up for him.

The pilot was reassigned to a different regiment. Here he encountered more experienced mentors, who assessed the incident differently: they realized that the lieutenant was no coward, that he had suffered deeply from his mistake.

Within a comparatively short period of time A. Postnov personally shot down 15 enemy fighters and was credited with an equal number of shared kills. This pilot had flown more than 500 combat missions by war's end. He was awarded the title Hero of the Soviet Union. He later became a major general of aviation and a highly-placed aviation commander. Remembering his early days, Aleksey Alekseyevich Postnov always endeavored to understand the psychology of young officers and to extend a helping hand at a difficult moment.

Practical aviation experience attests to the fact that not all pilots become adjusted to their new unit and actively become involved in its work immediately upon graduating from service school or after reassignment from another unit. They become familiarized with what is for them a new airfield, peculiarities of takeoff and landing, and study the flight operations area. But considerable time goes by before they feel at home at the new location, establish communication with their superiors and subordinates, and find comrades in their new regiment. In order to become adjusted more rapidly, newcomers need special attention and support on the part of their commanders and political workers.

Psychologically one can understand an officer's desire to look as good as possible right from his arrival at his new duty assignment. He endeavors not to make hasty actions or mistakes, especially in flying technique, which is a most important indicator of the combat pilot's maturity as a pilot, particularly since in flying, the richer a pilot's practical experience, the greater is his skill. But the total number of hours logged varies in its significance. Young bomber pilots, for example, log more hours in the air, but they make fewer landings. Therefore one cannot judge their skill merely by flight hours logged. Therefore one must approach each pilot, especially young pilots, in a rigorously individualized manner. It is not desirable that different instructors go up with him. This violates the principle of individual approach to training and hinders a pilot from developing confidence in his ability and from fully revealing his potential and ability.

Cases have occurred where recent graduates of pilot's school fly worse with an instructor than solo. This is due to the greater neuroemotional stress. The pilot senses that he is being watched, and therefore he flies in an inhibited manner.

Many years of experience confirm that no young pilot has ever refused a flight assignment, even if he was not entirely confident that he could carry it out successfully. The most common reason for this is a false sense of embarrassment and fear of losing respect. Of course it is not easy for a young pilot or newcomer in a regiment fully to grasp and thoroughly to analyze a flight assignment. His older, more experienced comrades should help him in this. If the task is

beyond his ability, he should be frankly told that. Otherwise he might get into a situation similar to that in which Captain Golubev found himself.

"We'll get there!" young military transport aircraft commander officer O. Golubev said to his crew, although he had never flown on this route and was not prepared to fly at night in IFR weather. As a result the aircrew lost its bearings and needed a ground assist to make it through to the alternate. This "we'll make it" came close to ending in tragedy.

Fighter pilots Sr Lt Ye. Karasev and Lt I. Rogozhin found themselves in an even more difficult predicament. During their first months of duty in a new regiment they did a good job on check flights. Flying during the day in VFR weather, they worked on maneuvers in the practice area, did cross-country flying, and delivered accurate fire on ground targets. They also did a pretty good job in mock air combat.

But they did not send these newcomers to tactical air exercises. They probably were correct in assuming that they were not yet capable of performing in a tactically knowledgeable manner in a near-combat situation. But they did send them off to another field to ferry back two fighter trainers.

The officers traveled to the destination by train. They were unable to take off for their home field on schedule. The engine of Lieutenant Karasev's fighter began emitting smoke on takeoff. The pilot decided to abort the takeoff. It was ascertained that when receiving the aircraft the officer had failed to check a fuel cap, which the ground crewmen had not closed tightly after fueling the aircraft.

In the meantime the weather was deteriorating, and it began to drizzle. Dusk was falling over the airfield. Lieutenant Rogozhin had never flown in these conditions. He failed to maintain heading and drifted off the runway centerline extended.

"And you were an instructor at flight school!" the flight operations officer reproached the lieutenant.

But it is the flight operations officer himself who should have been reproached -- he had failed to inquire how the young pilot had prepared for this assignment.

An inquiry into the incident revealed that Karasev had been inadequately prepared from a technical standpoint, while Rogozhin had gaps in his knowledge of practical aerodynamics. This was the first time they had ferried aircraft from an unfamiliar airfield. Faced with unfamiliar conditions, the young pilots were unable to handle the job on their own, while their superiors did not help them.

We know that every flight is different. A pilot learns something new every time up. When breaking in new pilots, a commanding officer should be guided by certain rules. First of all he should observe proper plan, schedule, and sequence in flight training, and he should rigorously monitor the actions of

subordinates during preliminary preparation and preflight procedures. It is no less important for all ground and flight training of young officers to take place in an atmosphere not only of strict demandingness but also of benevolence. Rudeness and arrogance do not at all help newcomers acquire independence. Sometimes a tactless remark by an instructor or commander in the air leads to mistakes. On the other hand, a kind word inspires confidence, helps one surmount the difficulties of familiarization, and creates a good frame of mind in young aviators.

One also encounters errors of a different kind. A young pilot who has graduated with good marks sometimes thinks he knows everything and that there is nothing new for him to learn in the line regiment. Such conceit leads to a situation where a newcomer overrates his own ability.

Once Lt V. Zubkov was to execute shallow and steep 360 degree turns in the practice area. Considering it an easy assignment, he decided to make it a little more complicated and to execute a few advanced maneuvers. But his engine shut down while he was in a steep climb. All attempts to restart the engine failed. At this point the lieutenant reported the problem to the tower controller, initiated a landing approach with the latter's assistance, and touched down far short of the runway. At the inquiry the pilot made a clean breast of everything. The commanding officer grounded Zubkov for lack of discipline. The pilot's willful addition of more complicated flight maneuvers could have made this the last flight in the life of the recent service school graduate.

Here is another example. Senior pilot officer A. Zabolotnyy received a duty assignment as flight commander in the neighboring regiment. He flew with assurance, performed air assignments without mistakes, but at first he did not do a good job of leading others -- he made methodological errors, especially during practice sessions and preliminary preparation for flight operations. He also had problems with debriefing and critique sessions following flight operations.

The squadron commander promptly noted these deficiencies, began visiting the flight with greater frequency, helped this officer, and gave him advice on methodology of conducting classes and organizing socialist competition between crews. And things improved. In time the flight became one of the best not only in the squadron but in the regiment as well.

Young pilots need thorough ideological conditioning in order to possess consummate mastery of today's fixed and rotary-wing aircraft, to become a complete master of the complex aircraft equipment. Indoctrination of winged defenders of the homeland on the ideas of Marxism-Leninism is the highroad toward forming excellent moral-fighting qualities in them, for increasing their ideological conviction and combat skills. CPSU Central Committee General Secretary Comrade Yu. V. Andropov stressed in his speech at the June (1983) CPSU Central Committee Plenum: "...The most vivid and interesting propaganda, the most skilled and intelligent teaching, and the most gifted proficiency will fail to achieve the goal if they are not supplemented by profound ideas and closely linked with today's realities and pointing the way toward further movement forward."



Speaking of ideological conditioning of recent service school graduates, we must focus close attention on its intimate linkage with matters of military indoctrination and dissemination of legal knowledge. Of paramount importance are indoctrination of young officers in a spirit of respect for their superiors, unquestioning execution of their orders and instructions, and concern about strengthening discipline, friendship and military comradeship, organically bound with the principles of Communist ethics and morality.

Young people must be helped daily to toughen their character and to develop in themselves faithfulness to military duty, boldness, decisiveness, and the ability to surmount difficulties. Young people should be taught to be very strict and demanding on themselves, and they should be reminded that the road to victory in aerial combat lies through numerous victories over themselves. In individual and group discussions and get-togethers with young officers, one should work tirelessly to explain to them the necessity and importance of observing military ethics and morality. This is an important condition for successfully forming and shaping a staunch and courageous character in the winged defenders of our socialist homeland.

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# KOMSOMOL ASSISTS IN STUDENT PILOT TRAINING PROCESS AT TAMBOV SCHOOL

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[Article, published under the heading "Komsomol Affairs," by Sr Lt P. Troshin: "Competition Hastened Takeoff"]

[Text] "Publicity and Open Discussion of Successes and Failures...  
Create That Social Climate in Which People Work Well."

From the proceedings of the June  
(1983) CPSU Central Committee  
Plenum

A Komsomol Central Committee Challenge Red Banner has been presented to the Tambov Higher Military Aviation School for Pilots imeni M. M. Raskova. At this school every other military aviator is excellent-rated in combat and political training. The number of proficiency-rated specialists, category-rated athletes, and Military Sports Complex badgeholders has substantially increased this past year, and several subunits have become excellent-rated. A good many useful initiatives have been given support at this school, such as "Every Class -- High Effectiveness and Quality," "A Komsomol Guarantee to Maintenance Work," and "Training Facilities -- A Komsomol Concern."

Socialist competition and rigorous observance of the Leninist principles of its conduct help aviation personnel successfully accomplish training and duty assignments. Considerable experience in this regard has been amassed in the squadron under the command of officer V. Kunin, twice recipient of the Order of the Red Star. The subunit successfully meets its socialist pledges year after year and is one of the best in the school. Many fine things have been accomplished by the Komsomol organization headed by Sr Lt O. Khozitskiy. Komsomol buro members endeavor to increase the spirit of competitiveness among the young people, to give a high degree of sharpness to competition, and to ensure that each and every officer cadet works persistently to master modern aircraft equipment. This task was assigned to the young people when competition results for the past training year was discussed at a Komsomol report and election meeting.

Emphasis at the time was placed on increasing publicity, comparability of results, exchange of know-how, and the possibility of repeating achievements.

And this is for good reason: it is a demand of the party, articulated in the proceedings of the June (1983) CPSU Central Committee Plenum. Delay and red tape cannot be tolerated in such an important matter, it was stressed at the Plenum, for delays and red tape translate into economic losses.

Considerable agitation and propaganda work is conducted in the subunit. Komsomol activists constantly explain to aviation personnel the linkage between current tasks in flight training and the end goal -- mastery of the military profession. They direct their efforts to ensuring that each and every Komsomol member perceives the importance of the assigned tasks in light of the decisions of the 19th Komsomol Congress and appraises his own capabilities and potential.

Activists prepared a display reflecting competition progress. It clearly specifies the pledges not only of each Komsomol member but also of crews, flights, and ground maintenance groups. The display clearly shows successes, deficiencies, and their causes. Each individual can compare his performance results with those of his competition rival and can figure how to catch up with the leaders.

Experience indicates that it is necessary promptly and regularly to reflect progress in meeting pledges, and more efficiently to conduct work with individuals among officer cadet crews, in order to avoid repeating mistakes in the process of training combat pilots. Before pledges were made, Komsomol buro members asked pilot-instructors officers A. Korniyenko and S. Volkov to tell Komsomol members what helped them achieve high results in pilot cadet flight training. These experienced military educators directed the attention of young instructors officers O. Khozitskiy, N. Usachev, and M. Pogorelkin to the importance of publicizing the results of pilot cadet accomplishment of the dual training program, for this generates active effort in young people, an endeavor to excel, and evokes enthusiasm and a strong desire to innovate.

Pilot cadet flight training began. The squadron Komsomol buro prepared well for this important stage in the training program. Komsomol members adopted individual pledges for each flying day. The first pilot cadet in the squadron to solo was S. Kamnev, student of military pilot-instructor 1st class Maj S. Volkov. That same day his competition rival, pilot cadet V. Savchenko, also soloed. Komsomol group organizer officer cadet I. Voytulevich organized printing of a newsflash reporting on this event. On the recommendation of the command authorities, Komsomol buro members helped Komsomol member S. Kamnev prepare to address his comrades. He related in detail how he had prepared for flight training and how he had maintained the proper glide path on final. His words had an appreciable influence on competition progress. A strong desire to overtake the leaders was aroused in the young pilots, and they became more confident of their ability.

Soon pilot cadets I. Shpak, V. Sizov, and V. Bezobrazov soloed. Previously they had felt constrained in the cockpit, had not been precise in manipulating the controls and performing cockpit procedures, and had been erratic in their landing sequence. Supported by the experience of their comrades, they succeeded in successfully accomplishing the task.

Seeking to give competition a lively, effective character, Komsomol buro members regularly disseminate advanced know-how and focus aviation personnel on stable end results. Komsomol activists officers N. Borisyuk, S. Shakhov, V. Zhuravlev, N. Usachev, and WO Yu. Arkhipov help the commanders ensure competition publicity. Flight operations shift performance results sheets, set up in an attention-getting and convincing manner, are displayed right at the field, where subunit personnel are to be found on flight operations days. Komsomol members take active part in putting out news sheets, printed newsflashes, news bulletins, and photone newspapers, which report the successful performances of crews, flight, and the squadron as a whole. They tell about the competition winners, name lagging performers, point out their shortcomings, and formulate tasks to correct and prevent them.

In order that the Komsomol organization be able rigorously to monitor how Komsomol members are accomplishing the flight training plan, the party committee proposed assigning Komsomol buro members to each flight and maintenance group, who would have the task of keeping the secretary and activists informed on affairs in the collectives. This method makes it possible to keep current on the local situation, to see successes and failures, and to respond to them quickly. The command authorities were critical of the Komsomol members of the flight in which Sr Lt A. Rokhlin serves as Komsomol group organizer. On the recommendation of the squadron commander, Rokhlin submitted a report to the Komsomol buro on the quality of preparation of the pilot cadets for flight training. They pointed out errors in Rokhlin's job performance and gave him practical advice. As a result of measures taken by the command authorities and Komsomol activists, errors in flying technique and radio procedures declined considerably in this flight.

Or take the following example. In the dual flight training program the pilot cadets of one of the crews displayed poor knowledge of the route and ground reference points. The Komsomol buro then recommended that navigator-instructor Lt A. Bozhin thoroughly study the cause and nature of the errors made by the young aviators and hold individual instruction classes with pilot cadets V. Gorovenko, V. Kostin, I. Dobryakov, and O. Kibal'nik on studying the area and pattern of flight operations in the vicinity of the airfield. Results were soon apparent: errors stopped occurring. Consolidating achieved results, the Komsomol activists related in a news bulletin leaflet about the work done by officer A. Bozhin and the pilot cadets' successes in meeting socialist pledges. This also proved useful for other crews as well.

Pilot cadet V. Dashuk was unable to solo at the scheduled time. Partly to blame for this was pilot-instructor officer A. Zakharov. The Komsomol buro members analyzed the situation and concluded that some pilot-instructors lacked experience in working with pilot cadets, particularly in the area of moral-psychological training. They conferred with the squadron commander, deputy commander for political affairs, and party buro secretary. They jointly decided to arrange for the squadron's best methods specialists to address their younger comrades. Soon such a presentation was held. Senior pilot-instructor Maj A. Korniyenko and other officers shared their experience and know-how in preparing student pilots to solo. This was definitely of benefit. Young pilot-instructors Sr Lts O. Khozitskiy and N. Usachev achieved success in

training their students: pilot cadets A. Vorob'yev and S. Purtov, who had been having problems, successfully soloed.

In what way is this example noteworthy? In the fact that squadron Komsomol activists do not merely take note of certain facts, do not wait to be told by squadron authorities where they should focus their attention, but come out themselves with suggestions aimed at improving the training and indoctrination process, student pilot flight training, and at increasing effectiveness of competition. This work style is in conformity with the demands of the June (1983) CPSU Central Committee Plenum, is practical and innovative, and produces substantial results. An atmosphere of demandingness and comradely mutual assistance has been created in the squadron, and each aviator is aware of his personal responsibility for the state of affairs in the entire subunit and for achieving socialist pledges. As a result the squadron is a leader in competition and accomplishes assigned tasks in a high-quality manner.

Does this mean that all problems have been resolved? Of course not. The squadron Komsomol buro still must correct certain deficiencies which occurred last year, and it must help officers more purposefully organize socialist competition among student pilots during preparations for performing flight training assignments, and they must do a better job of disseminating the experience and know-how of leading performers and state precisely what constituted the foundation of success. This handling of the matter will unquestionably promote a further increase in effectiveness of competition and enhance its role in training skilled combat pilots.

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## FLIGHT INSTRUCTOR, STUDENT PILOT RELATIONSHIP CONSIDERED

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[Article, published under the heading "Military Educational Institution Affairs," by Maj A. Berkutov: "Inseparable Linkage"]

[Text] Every year young fliers graduate from higher military aviation schools for pilots. When one looks at the happy faces of the lieutenants standing smartly in formation, one does not think about the difficulties which their instructors sometimes encountered in the process of training them. At such moments every pilot-instructor feels a deep sense of satisfaction from the results of his labor. Each graduation ceremony is followed by another round of training routine -- the instructors proceed to train the next group of pilot cadets.

Training fighter pilots is no simple matter. It demands of their instructors considerable moral and physical strength and energy, a high degree of professional expertise, knowledge of psychology and education science, and the ability rapidly to develop firm professional skills in these young men. The training process is formed, as it were, of two inseparably interlinked stages: preparation of instructor personnel, and training of the pilot cadets.

The demands imposed on the pilot-instructor are spelled out in the corresponding documents which govern flight instruction activities. We shall state frankly that there are a fair number of such documents, and therefore it is no simple matter to develop a specialist who fully meets the provisions of these documents. First of all, to achieve successful flight training of pilot cadets it is essential that the pilot-instructors themselves execute flight assignments with confidence and precision, master new maneuvers without difficulty, and demonstrate excellent flying technique.

As a rule instructors are selected from the ranks of recent graduates. As practical experience indicates, however, a minimum of 2 or 3 years are required for a young officer to become an instructor and indoctrinator of future pilots on a given type of aircraft. During this period, in addition to the future instructor's commitment to his own development, a decisive role is played by the attitude of senior command personnel toward these young officers. Experienced commanders study their personality and character, knowledge of theory and

flight proficiency in advance, determine their proclivity toward teaching activities, and endeavor from the very outset of their service to develop in them those traits which are essential to an instructor and indoctrinator. This is difficult and painstaking work. It is no secret that graduating pilots are not particularly anxious to remain as instructors. Most of them want to serve in a line regiment. And those who want to devote themselves to instruction sometimes are not distinguished by excellence of flying technique.

A conclusion suggests itself: would it not be more advisable to identify potential instructors in advance? Pilot cadets with proclivities toward teaching and who possess excellent flying technique, for example, could be selected during their final year at school. Many commanders of pilot training subunits make such a comment. They are of the opinion that by identifying potential future instructors, at the end of the third year, for example, they can be worked with in a purposeful manner during the fourth year. It might also be a good idea to assign to instructor duty experienced pilots from line units. Unquestionably there are persons among them who would like a duty assignment as a flight school instructor, who would like to devote their knowledge and wealth of flying experience to our future pilots.

The authorities and political agencies at pilot schools draw attention to training instructor personnel to fly in all weather, day or night. Practical experience indicates that this is an important factor in the successful development of a pilot. If an instructor has confidence in himself, if he can do an excellent job flying in any kind of weather, his confidence is transmitted to his students. The learning process is continuous. If the future pilot goes through the dual training program in comparatively bad weather conditions, bad weather will not dishearten him when he is flying solo, a particularly important point.

Theory training of instructor personnel is an important item. We must confess that sometimes, amidst the daily work routine, with intensive student pilot flight activities, not enough attention is devoted to this matter. And the instructors literally remain all day in the cockpit, especially during good weather. Therefore favorable conditions should be maximally utilized. But how should we handle theory of education, theory of psychology, and flight training methodology? Improvement is also quite essential in these areas. Initially acquired knowledge, if not added to and reinforced, quickly evaporates, we must state quite frankly. Of course it is no easy matter to organize instructor theoretical training, especially during the period of student flight instruction. And they understand this in the schools' flight instruction department. But it nevertheless sometimes happens that classes for instructors in a training regiment, in spite of thorough preparation for such classes, are conducted without consideration of the tasks being performed by flight personnel, especially during the fall and winter. In this connection as well one can understand the officers' desire to see more frequently in the regiment experienced flight instruction department instructors presenting systematized theoretical materials which maximally approximate the tasks which will be performed in the process of student flight instruction. It sometimes happens, however, that instructors study topics which are not directly related to their immediate duties.

Synthesizing what has been stated, one can conclude that it is possible successfully to train young pilots only with careful selection of pilot-instructors, proficient flying and knowledge of theory on the part of flight instructors.

There is a hard and fast rule in aviation: high-quality, comprehensive preparation on the ground is a guarantee of success in the air. From the day pilot cadets arrive at their training squadron, their knowledge and ability to work with flight and navigation instruments are revealed at combined training classes and in the process of preparing for flight activities. During this period instructors focus primary attention on detailed study of cockpit procedures at various stages of a flight.

Flight commander military pilot-instructor 1st class Maj Yu. Gurtov plans and organizes his work in a methodologically competent and purposeful manner. He carefully studies the level of pilot cadet proficiency in their preceding studies. This enables him to determine who is capable of soloing first, and who needs additional training classes and practice sessions. Gurtov also always bears in mind that close relations and mutual respect between instructor and student greatly assist in ensuring that pilot cadets advance through the training program. And it is not surprising that the flight under his command is one of the best. Misunderstandings rarely arise in this collective. The well-prepared instructors handle their duties in an excellent fashion. They know that the student pilots are proud of an instructor who not only possesses excellent mastery of his aircraft and teaches them to fly but also has a grasp of matters dealing with life in general; his demandingness is combined with an understanding of their interests and aspirations. And it is quite natural that the future pilots respond in kind.

As we know, success in flight training depends in large measure on the quality and smoothness of the dual instruction program. The work previously done by pilot-instructors is reflected in full measure precisely during this period. If instructors are prepared to teach student pilots in all weather, the dual instruction program is accomplished rapidly, goes smoothly and, as a rule, produces excellent results. In other words, the degree of preparation of the instructors directly reflects on the quality of training of the future pilots.

Experience indicates that after soloing, for a certain period of time a pilot cadet flies evenly, confidently, and does as he was taught. A special period then ensues. Lacking adequate experience and solid skills in flying technique, a young pilot may start making mistakes due to excessive self-confidence. The instructor's skill consists precisely in sensitively capturing that moment and giving the pilot cadet effective assistance in a prompt and timely manner.

Pilot cadet A. Knysh had an excellent theoretical and practical flying foundation. He was one of the first to solo, flew with sureness and confidence, and earned marks of good on his landings. It would seem there was no cause for concern. But then, after his fifth training flight, Knysh touched his aircraft down short of the runway. An analysis of the flight indicated that the error was due to the fact that the student pilot had overrated his own ability. He had ignored the instructions which his instructor had given him during the

preflight briefing, and he had failed to take into account wind direction and velocity on his landing approach. After crossing the middle marker with SPS [boundary-layer ejector ] system on, the aircraft, maintaining low airspeed, dropped below the glideslope. The student pilot stopped his descent and tried to stretch it to the runway. Throttling back, as in a normal landing, he touched down short. A detailed analysis of the flight helped Knysh understand the reason for what had occurred, and he never made the same mistake again.

Pedagogic tact and comradely sympathy by the instructor are very important at such, frankly, difficult moments. A young man reacts acutely to a setback; he may feel that he has reached a limit which he cannot advance beyond. A so-called psychological barrier frequently arises here. Experienced instructors bear this fact in mind and make their comments to the student pilot in a courteous manner, in order not to injure his dignity, explain his error, and support him at a difficult moment. This helps him regain confidence.

In flight groups where the instructor enjoys respect, as a rule mutual relations are grounded on honesty, sincerity and kindness. The student pilots know that if the instructor has praised them, this means that there was a reason to do so, and the same is true if he rebukes them. Such an atmosphere strengthens military discipline and develops in the men a feeling of obligation, responsibility, and follow-through. They endeavor to emulate him in all things and stand behind him foursquare, as they say. Personal exemplariness and a correct attitude on the part of a flight instructor help in developing a genuine combat pilot and help form firm Communist convictions in him.

It would also be appropriate to state that as a rule flight schools are located in large cities. This means that men wearing light-blue shoulderboards are always in view of working people and the younger generation. They are frequently invited to visit enterprises, secondary schools, and other educational institutions. A question arises in connection with this: are aviators doing everything possible to publicize flying and to attract our finest young people into the Air Forces? Unfortunately we must confess that frequently the initiative for talks and get-togethers comes from the administration of municipal establishments, not from the schools. For the most part Air Forces schools, performing their primary job of training combat pilots, forget about the importance of publicizing the courageous flying profession. We believe that if each and every aviator, beginning with the first-year pilot cadet, will constantly devote attention to this important matter, young men who are dedicated to the sky and totally faithful to their chosen profession will join the ranks of winged warriors. Prior to entering service school they will make every effort to learn as much as they can about our glorious Air Forces.

The process of training pilot cadets is complex and diversified. In an innovative search for effective teaching techniques, commanders and pilot-instructors work out new methods grounded on the experience of student flying. The purpose of the job being done by the personnel of training subunits is to prepare ideologically firm, politically knowledgeable air warriors to defend the peaceful skies of our homeland, people who are capable of skillfully performing any and all combat missions.

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## YOUNG PILOTS LEARN TO CONTROL NERVOUSNESS

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 1, Jan 84 (signed to press 2 Dec 83) p 21

[Article, published under the heading "Flying and Psychology," by Lt Col N. Atrokhov: "Overcoming Oneself"]

[Text] Capt I. Ivanovskiy was nervous that day: one of the pilots in his flight, Lt Yu. Krasikov, was to take a check ride with the squadron commander in IFR weather in order to be cleared for solo operations. The flight commander had worked hard to prepare the pilot well and had endeavored to transmit to him all his own experience and know-how. On the most recent training flights Krasikov had performed competently and had made no serious mistakes. Although setbacks had occurred during the training process, Captain Ivanovskiy had confidence in the young pilot and scheduled a check ride for him. But now doubts began gnawing away at him. He noted that Krasikov was uncommunicative and seemed depressed. Every pilot knows how important high spirits and a good psychological attitude are before a flight. The flight commander tried to cheer up his subordinate, but was unable to change his mood.

Krasikov taxied to the active, set his gyro, and lowered his flaps to the take-off setting. Receiving clearance from the tower, he lit the afterburner. The aircraft began its takeoff roll. The lieutenant maintained precise heading, promptly retracted his gear, and correctly entered the pattern. The squadron commander, in the rear cockpit, was pleased with the pilot's performance.

But after turning onto final Krasikov began making mistakes and was losing altitude rapidly. Taking over the controls, the squadron commander prevented the aircraft from touching down short of the runway.

During the ensuing critique the squadron commander told Captain Ivanovskiy that he had failed to teach the pilot proper landing approach procedures and had overrated his ability. Ivanovskiy felt that the main reason for the failure lay not so much in Krasikov's inadequate level of proficiency and inability to distribute his attention on landing approach as in poor psychological preparation. Because of this he was unable at a critical moment to control his nervousness and to force himself to perform with precision.

After he and Lieutenant Krasikov were alone, the flight commander asked him: "What do you think is the reason for your failure?"

The young officer confessed: "I just can't figure it out, Comrade Captain. When I would go up with you, I would do a pretty good job of landing. But when the squadron commander was on board, it was like I was a different person. During the flight I kept thinking about not making any mistakes, afraid that the squadron commander would not give approval for me to go up solo."

Captain Ivanovskiy understood his subordinate very well. He was young and inexperienced. He had not yet learned to control his emotional state. His thoughts were occupied not so much by the sequence of flight procedures as by anticipation of how the strict, demanding squadron commander would rate his performance. This had a constraining effect and deprived him of freedom of thinking and action.

He was embarrassed to admit it, for he knew Krasikov as the flight's most diligent pilot. He had been that way at school, and he had proven to be such a pilot in the line regiment while retraining on what was for him a new aircraft. The lieutenant's admission helped determine ways to make him better control his emotions.

At the same time the flight commander realized that a confidential discussion was not enough. It is necessary to help a pilot develop psychological stability. But how? He went over and over in his mind Krasikov's performance in the air and on the simulator. It seemed that he had done everything correctly, but Ivanovskiy was haunted by the thought that a mistake had been made somewhere. It was necessary to go up dual with him again.

...Completing the check ride, the lieutenant proceeded to make his landing approach. It was time to flare, but the pilot was slow about it. The instructor's hand by habit began pulling back on the controls. Suddenly Ivanovskiy felt the student pilot, as if coming to a sudden realization, initiate his roundout. Something clicked in his mind. He realized that he, the instructor, without even realizing it, had been excessively shepherding his student in the air, with his hand movements unwittingly cueing the student pilot when to begin roundout! This meant that his student had not yet learned to determine for himself the moment at which to flare, and aware that the squadron commander would not cue him, he became quite nervous on the check ride.

As soon as they taxied to the ramp and were climbing out of the cockpit, the flight commander asked the pilot several questions. The replies confirmed the correctness of his surmise. Now it was clear what was to be done....

After several practice sessions Ivanovskiy again scheduled a check ride. He warned Krasikov that he would not touch the controls. The lieutenant did not make a single mistake on the check flight.

That same day the flight commander reported this to the squadron commander. He felt great inner relief and tranquility. All his doubts were gone. Attentively

hearing him out, the lieutenant colonel smiled and said: "So you found the cause? Good. Schedule Krasikov a check ride with me."

This time he received a mark of excellent. In time Lt Yu. Krasikov learned to fly with confidence in IFR weather. This was a joint victory for the flight commander and his pilot, who had succeeded in surmounting a psychological barrier.

Ivanovskiy had not had an easy time of it when he first became a flight commander. The squadron commander told him in a frank conversation that at first he was unable to keep a focus on the main point and wasted his time on trivial matters. The flight had been highly ranked in the squadron, and in order to maintain past performance the flight commander had to improve his work style, strengthen discipline, handle his men properly, and focus particular attention on improving flying technique.

"Compare everything you do with the main objective: how does this agree with that which will be necessary in actual combat. Devote more time to methodology," the squadron commander advised him.

The advice given by this experienced pilot forced the young officer to think. He became particularly acutely aware of the great demands imposed today on the flight commander, his theoretical and methodological preparation. How important it was to possess flawless knowledge of one's aircraft and weapons. Today's aircraft are capable of attacking air and ground targets in all weather, day or night. And he, a flight commander, had to teach his men to utilize their aircraft efficiently in combat.

Capt I. Ivanovskiy has a serious and responsible attitude toward his job and works a great deal to improve his methods skill. In the new training year the young pilots of his flight have set tough performance targets for themselves. And their commander, supported by advanced know-how, is endeavoring to hasten the development of the young pilots.

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## MODERN ROVING FIGHTER TACTICS ANALYZED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 1, Jan 84 (signed to press 2 Dec 83) pp 22-23

[Article, published under the heading "Experience Born in Combat," by Candidate of Military Sciences Col Yu. Vetrov and Col P. Isayev: "Roving Fighters"]

[Text] Failing to achieve success in a massive air attack, the "aggressor" proceeded to send in small groups in waves along a broad frontage. Under the protection of jamming, coming in at low level and hiding behind terrain, his tactical aircraft delivered strikes without entering the antiaircraft missile impact zone. Therefore the fighter commander decided to destroy the "aggressor" aircraft above enemy territory. The most experienced pilots were assigned the mission of independently seeking out air targets in designated areas and destroying them.

The pilots conducted tactical drills in preparing for the exercise. They rehearsed techniques of search and aerial combat above "aggressor" territory, bearing in mind that limited information on the air situation would be received from command and control facilities, and they studied the combat experience of Soviet roving fighters during the Great Patriotic War. In formulating air combat variations they considered moral-psychological factors, performance capabilities of new offensive air weapons, and the increased combat capabilities of today's aircraft.

Roving as a method of fighter combat operations to destroy enemy aircraft in the air was born in World War I. It essentially consisted in the fact that well-trained pilots were given complete freedom of action in the air. In conditions where means of aircraft control were lacking, autonomous pilot actions played a certain role in combating hostile aircraft. Soviet fighter pilots flew more than 31,000 roving sorties and destroyed approximately 9,000 enemy aircraft. The effectiveness of this mode of action proved to be 3 to 4 times that of others. Hero of the Soviet Union Mar Avn G. Zimin stresses in his book "Taktika v Boyevykh Primerakh" [Tactics in Combat Examples] that if an enemy aircraft was shot down from bomber formations even before they reached the battle line, this strongly affected the morale of the other fascist aircrews. If our "hunters" downed several aircraft, the enemy would release his bombs over friendly territory and frequently would turn back altogether.



The Hitlerites also employed roving fighters, especially in the initial period of the war. They operated for the most part in the vicinity of airfields, would join formation with aircraft returning from a combat mission and would attack them as they were approaching to land.

Employment of roving fighters was preceded by considerable organizational work by commanders and tactical innovation by pilots. Pilots developed the requisite moral-fighting qualities and mastered roving fighter tactics.

The principle of roving fighter combat formulated by Soviet military science and practical combat during the war years boiled down to the following. Roving fighter actions were considered maximally effective when air superiority was basically achieved; roving fighters would down enemy aircraft over enemy territory on the far avenues of approach to defended troops and installations; roving fighter groups would be made up on a volunteer basis from the most highly-trained combat pilots; the roving fighter pilot had to meet particular personality and character requirements.

Hero of the Soviet Union G. Golubev writes in his book "V Pare s 'Sotym'" [Flying Leader and Wingman With Tail Number 100]: "Many pilots would like to fly roving fighters, but not everybody is qualified, due to a number of specific features.... Roving fighter pilots must have the keen nose of a hunter in order to avoid themselves falling prey. One must possess thorough knowledge of the air and ground situation behind enemy lines, be skilled in flying in clouds on the gauges, and possess expert marksman proficiency in aerial gunnery.... There is no place here for uncertainty or confusion...."

It was important for a roving fighter pilot to possess thorough knowledge of enemy aircraft and tactics, enemy aircraft silhouette identification, to know their most vulnerable points, the enemy's defensive fire system, and possess a high degree of navigating proficiency. The principles of roving fighter combat were officially stated in a directive issued by the commander of Red Army Air Forces dated 14 September 1942. A major contribution toward formulation of roving fighter tactics was made by famed pilots thrice Heroes of the Soviet Union A. Pokryshkin and I. Kozhedub, twice Hero of the Soviet Union N. Skomorokhov, Hero of the Soviet Union G. Golubev, and others. Clearly evident in the published memoirs of these aviators is a system of "hunter" training and indoctrination and search for the most effective tactics of air combat in various conditions.

Roving fighters would penetrate enemy airspace undetected, into areas with the highest probability of enemy aircraft movements. Toward this end pilots would select sectors along the fronts where ground troops were less active, where they would be concealed by the sun and cloud cover, and with the initial deployment of radars they began taking into consideration the location of radar sites and radar detection zones. Bad weather was extensively exploited. Mar Avn A. Pokryshkin recalls: "During bad weather roving fighter operations became practically the sole type of air activity."

As the war progressed, roving fighters penetrated increasingly deeper into enemy-held territory. At first they were penetrating 60-80 kilometers behind

enemy lines, while later penetration ran 150 kilometers and more. Fighters roved in the vicinity of airfields, along aircraft routes to and from combat, and also took into consideration the tendency of fascist pilots toward predictable pattern and routine, especially in the conduct of aerial reconnaissance. Roving fighters would attack single aircraft which had just taken off or were returning from a combat mission, as well as transport and liaison aircraft. In addition, special groups of roving fighters would be tasked with destroying enemy roving fighters. Pilots would select an altitude based on visibility and hostile antiaircraft artillery fire, and would shift from low to medium altitude as it became necessary.

Roving missions were flown in pairs. Roving missions against roving fighters were most frequently flown by flights of 3 or 4 aircraft. Particular attention was devoted to mutual understanding and precise coordination in the two-ship element. A pair of fighters would select a formation which ensured optimal search conditions to the leader and wingman and would eliminate the possibility of surprise attacks by enemy fighters in a situation where there was no information whatsoever available from the ground on the air situation. Mission success depended entirely on the preparedness and proficiency of both pilots. The leader was the battle initiator, while the wingman, while conducting continuous search and position orientation, had the task of immediately providing fire support to the leader, of fighting off an enemy attack or attacking first, in order not to lose the element of surprise and the tactical advantage. If it was determined in the course of a mission that there was little probability of appearance of hostile aircraft in a given area, the pilots would hit ground targets: rail consists, vehicle columns, and staff cars.

Roving fighters always conducted air reconnaissance. Our famed air aces tell how thoroughly they prepared for each mission, working out in detail the actions they would take at all mission stages, especially in air combat. Pilots were already extensively employing graphic-analytical simulation to devise tactics. "The dugout of Captain Pokryshkin, who at the time was the regimental aerial gunnery service chief, was completely hung with diagrams and drawings of aerial combat," recalls G. Golubev, Aleksandr Ivanovich's wingman. Mar Avn N. Skomorokhov quotes in his book a statement made by roving fighter squadron commander Krasnov: "Our business is a new one.... We must prepare thoroughly for it.... First we shall fight on paper."

Pilots thoroughly studied the "hunt" area in preparing for a mission. The pilots would work out themselves the route, profile, mission configuration, formation, and aerial combat tactics. Their experience was being continuously studied and synthesized at tactical air conferences in the corps, divisions, and regiments. Skilled actions were publicized and disseminated in combat news sheets and instruction pamphlets.

Fighter combat operations have greatly changed in present-day conditions. Air-space is under scrutiny by ground and airborne radars to a distance of several hundred kilometers from the line of contact and virtually at all altitudes. The combat performance capabilities of fighter aircraft have also expanded. Their airborne radars can detect hostile aircraft in all weather, day and night, at considerable range. Air-to-air guided missiles also possess considerable

capabilities. Airborne computers have become an integral component of the modern fighter aircraft, solving target closing and aiming problems.

From materials published in the foreign press one can see two main trends in the evolution of combat aviation: increased purposefulness of mission action by fixed-wing and rotary-wing strike aircraft and air defense fighters through development of command and control systems ((PLSS), AWACS), and efforts to provide capability to deliver highly-accurate strikes from friendly-territory standoff distance with cruise missiles and air-to-surface missiles. With this bourgeois military theorists seek on the one hand to reduce to a minimum the role of the human operator in battle, to withdraw him from a zone in which people's ideological conviction, will, and dedication to a just cause clash, elements which in the final analysis determine the outcome of an armed struggle, while on the other hand they seek to ensure effective combat operations by their air forces, through the use of new hardware and tactics.

As is indicated in the foreign press, however, discussing the experience of employment of air forces in local wars unleashed by imperialism, with electronic countermeasures and suppressive fire one can disorganize a fighter and anti-aircraft missile command and control system, while in order to combat the new offensive air weapons it is necessary to destroy the weapons-delivering aircraft and command-control system aircraft over enemy territory.

Based on this experience, foreign ~~military~~ experts devote considerable attention to autonomous fighter tactics to destroy hostile aircraft above enemy territory, that is, roving fighter tactics are valid in present-day conditions as well. Employment of these tactics, however, is connected with the necessity of resolving a number of problems, the most acute of which is considered to be that of achieving undetected penetration of hostile territory by roving fighters in conditions of radar early warning. In particular, the British magazine FLIGHT discusses the problem of identification of an air target detected by radar sight, identification both of nationality, type and group makeup, which is important for selecting direction of attack and maneuver. Closing an unidentified target on a head-on course can produce a straightforward one-on-one combat situation. That pilot whose sight "sees" further and whose air-to-air missiles have greater range will be at an advantage.

In the opinion of foreign military experts, aircraft with sights and weapons providing capability to deliver munitions simultaneously at several targets at different bearings and ranges can exert considerable influence on fighter tactics in autonomous actions. Such aircraft include the interceptor version of the F-14 Tomcat and Tornado fighters. Their combat employment, however, would be in combination with other, lighter and smaller fighters. A heavy fighter locates and attacks an air target at considerable range. But when the element of surprise has been lost and the adversary has initiated defensive maneuvers, lightweight fighters engage, while the heavy fighter withdraws under cover of the former. Such tactics supposedly expand fighter capabilities in autonomous actions, but utilization of multiple-function airborne radars by roving fighters gives them away and discloses their position, which must be considered when devising a plan of engagement.

As Western air-force experts note, penetration of air defenses is a serious problem for roving fighters. To accomplish penetration pilots must possess detailed knowledge of the performance capabilities of antiaircraft missile systems, their location and the character of ground troops actions, and must aggressively employ airborne ECM gear. The problem of training and preparing roving fighter pilots both from a professional and moral-psychological respect is considered no less critical.

Thus changes in the development of combat aircraft in present-day conditions do not exclude extensive employment of a mode of fighter operations analogous to the roving fighter combat practiced in World War II.

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## STUDENT PILOTS PREPARE MENTALLY FOR IN-FLIGHT EMERGENCIES

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[Article, published under the heading "Military Educational Institution Affairs," by Candidate of Medical Sciences Lt Col Med Serv V. Lozinskiy: "The Officer Cadet Did Not Lose His Head"]

[Text] As we know, the probability of occurrence of emergency situations in the air depends principally on reliability of the aircraft, the pilot's level of proficiency, and his psychophysiological state in the air. As a consequence of development and adoption of modern forms and methods of psychophysiological and professional preflight training in the pilot cadet training curriculum, in recent years there has been noted a downward trend in the number of near-accident situations and gross pilot errors. This means that reserve potential for achieving further improvement in flight safety is to be found in the future pilot's preparedness and readiness for a specific assignment and actions in emergency situations. In other words, his psychophysiological reliability in the complex system of man-machine interaction is of determining significance for ensuring accident-free flight operations.

The reliability factor is determined in large measure not only by the ability of the student pilot to compare a mental model formed by preceding experience and preparation to carry out a scheduled flight training activity with the actual flight, but also by his ability to predict possible future changes in its character. This enables one to evaluate a situation dynamically in a prompt and timely manner and to formulate one's strategy of conduct. Consequently, while still on the ground one should form a unique mental plan of action in the air, a so-called conceptual model, to use the terminology of aviation psychologists.

A pilot flies his aircraft on the basis of comparing a conceptual model with an information (actual) model, that is, he should have a corresponding action-decision image for a corresponding flight situation information image. Practical experience indicates that the fuller and more accurate the conceptual model, the more cleanly and reliably the flight is executed. Thus all preparation for a flight essentially boils down to forming this model. All variations of errors, deviations, equipment malfunctions and the like are incorporated in a complete model.

Nor does it exclude the phenomenon of stress. Its principal cause is inadequate information in the memory for rapid decision-making in a hazardous situation. It is well known that the less a person knows and is able to do, the greater his nervousness in performing a job.

A conceptual model is added to and refined both during actual flight (acquisition of experience) and during preparation for a flight, while studying guideline documents, special literature, diagrams of the flight assignment, and potential situations in the air. Running through actions mentally, a so-called imaginary flight, is nothing other than verification of a prepared model and its detailing and refinement on the ground. This is a most important element of a pilot cadet's professional and psychophysiological preparation for a flight.

Special studies conducted at military flight schools have shown that many pilot cadets are unable to execute imaginary flights vividly, graphically, and sequentially. This requires regular practice. Repeatedly running through a flight, emergency situations, and one's actions with modeling of behavior in complex situations helps verify knowledge and adapt oneself to conditions of working in normal and stress situations.

Pilot cadet S. Ivanov possessed inadequate moral-psychological preparation. In addition, he was unable clearly to visualize the aircraft's behavior and his own actions when flying in IFR conditions. And here is what happened. During a cross-country flight he encountered clouds. Instead of flying around them, as his commanding officer had instructed at the preflight briefing, the student pilot decided to test himself. He flew into the clouds, lost his spatial orientation and, in a stress state, ejected from an aircraft which was functioning perfectly normally. Ivanov did not know what would happen when he entered clouds or how to act. He lacked both experience and model of personal actions.

Pilot cadet A. Volynov practiced hard and persistently on executing imaginary flights and modeled his actions and conduct in emergency situations. This future pilot considered engine failure on takeoff to be one of the most difficult emergency situations. He therefore regularly went through in his mind all possible action variations, possible errors and their correction. His diligent training produced positive results. Once Volynov had an engine failure at an altitude of 3,000 meters. The pilot cadet did not lose his head but acted with precision and conducted himself in a calm manner. He reported the incident to the tower, after which he restarted his engine and successfully landed at his home field.

Volynov reported that the engine-out situation did not put him in a state of stress, since he had repeatedly "experienced" this situation and had adapted to it. For this reason the pilot cadet realistically assessed the situation, available time, and his options. Another reason for Volynov's intelligent actions is the fact that he had prepared himself in advance for a more difficult engine-out situation than that which actually occurred. In his mind he had worked out and stored away several variations and, actually encountering the simplest of these, the pilot cadet did without great exertion everything prescribed by regulations.

Our specialists studied in detail three cases of engine shutdown in the air which happened at different times, when the pilot cadets responded correctly and the flight ended without incident.

In such situations the manual prescribes that the pilot shall make a forced landing or eject. On the simulator, however, student pilots for the most part practice engine restarting procedures. This is solidly established in their consciousness, and therefore the first thing they proceeded to do automatically was to restart their engine in the air. Calculations indicate that this requires 35 seconds to accomplish. From 15-20 to 60 seconds are required to prepare for a forced landing. Ejection requires 5 seconds.

What is the obvious conclusion? Depending on the situation and time available, a pilot is obliged to play the odds correctly, ensuring his own safety. But the safe outcome of the above-described emergency situations should encourage pilots to perform cockpit procedures precisely by the book and to practice actions in response to engine failure at various altitudes (from ground level to the aircraft's ceiling).

The above examples indicate how important it is to prepare oneself for difficult situations, by systematic, purposeful, repeated execution of flights in one's mind, modeling potential emergency situations, one's actions and behavior. It is very important that student pilots constantly practice, even during off-duty hours, especially just before bed. Commanders, flight instructors, and classroom instructors should draw students' attention to the effectiveness of mentally going through flights during forced interruptions in flight operations. It is for good reason that they say that 10 flights executed mentally equate to one actual flight.

The ability to think vividly and to go through one's actions in detail when mentally executing a flight and responding to various situations comes with practice. It depends in large measure on the attitude of the pilot cadets themselves, their awareness of the importance and effectiveness of mentally going through a flight, as well as on self-demandingness and conscious self-discipline. Such a mental exercise disciplines a student pilot, psychologically prepares him for a flight, and forces him to clarify all details and unclear matters. In other words the student prepares thoroughly and comprehensively for a flight.

In modeling one's work performance and behavior in emergency situations, one should mentally work on skills in psychophysiological self-adjustment in the following sequence. One should bring oneself to a calm, even state, then evaluate the situation, estimate available time and one's options in different response variants. One should then report the incident to the tower, make the optimal decision, on the basis of available time and ground commands, and then correct the hazardous situation with aggressive, purposeful actions.

Repeated mental execution of such exercises helps one develop a sequence of actions and rehearse one's conduct in emergency flight situations. Student pilots who have followed these recommendations have noted increased personal

emotional stability, which has helped improve the quality of execution of the flight training program. Thus constant drill and practice going through flights mentally, with emergency situation scenarios, makes it possible effectively to improve the psychophysiological preparedness of a future pilot for possible complications during flight, as well as his professional skills.

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## CZECHOSLOVAK CONTRIBUTIONS TO SPACE RESEARCH REVIEWED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 1, Jan 84 (signed to press 2 Dec 83) pp 28-29

[Article, published under the heading "Space Program in the Socialist Countries," by M. Rimsha: "Visiting Our Czechoslovak Friends"]

[Text] Dear readers! With this article the editors complete a series of articles, begun in 1982, on the work of specialists from the USSR and the other socialist countries in study and exploration of space with the Interkosmos Program. Let us know what articles in this series were most memorable to you and what you would like to learn about this subject in the future.

An event took place on 2 March 1978 which signaled the beginning of a fundamentally new stage of international cooperation in space exploration. On that date the Soyuz-28 spacecraft was launched into orbit, carrying USSR pilot-cosmonaut Aleksey Gubarev and cosmonaut-researcher Vladimir Remek, a citizen of the Czechoslovak Socialist Republic. On 3 March the spacecraft docked with the Salyut-6 - Soyuz-27 orbital complex manned by Soviet cosmonauts Yuriy Romanenko and Georgiy Grechko. The first international crew proceeded to work in space within the framework of the Interkosmos Program.

Research on the Interkosmos Program is being conducted in several fundamental areas of space science: physics, biology and medicine, meteorology, communications and remote Earth sensing with the aid of aerospace vehicles. Staff members of Czechoslovak scientific organizations and industrial enterprises are working productively in each of these research areas. They are designing and building instruments and systems, are devising experimental methods, implementing this methods, and analyzing obtained results. The work of the Czechoslovak space researchers, carried out jointly with colleagues from the USSR and other socialist countries, receive high praise at the most representative international scientific forums and are generating steadily increasing respect for their authors in the world scientific community.

What is the basis of the advance of space science in Czechoslovakia? First and foremost that country's considerable scientific and technical potential, multiplied by the creative enthusiasm of scientists and specialists, the labor of whom has been invested in carrying out scientific and technical experiments

conducted on 21 satellites of the Interkosmos series and on all 11 Vertikal research rockets which have been launched. This represents a substantial contribution to the Interkosmos Program!

Fourteen years have passed since the launch of the Interkosmos-1 satellite, with which Czechoslovak astrophysicists commenced experiments directly in space. The staff of the Czechoslovak Academy of Sciences (CSAS) Astronomical Institute began with this satellite the ambitious task of studying solar short-wave radiation together with colleagues from the GDR and USSR. Institute scientists were also involved in experiments on board the Interkosmos-4, -7, -11, and -16 satellites, as well as subject-related research on the Vertikal-1, -2, -5, -7, -9, and -11 rockets. These "solar" experiments produced a large volume of valuable scientific information, of which we should make particular mention of the first-ever recorded phenomenon of polarization of solar-flare emission.

Working together with Hungarian and Soviet specialists, staff members of this institute developed apparatus for measuring streams of micrometeorites in near-Earth space, which was carried on a number of space vehicles of the Interkosmos Program.

The CSAS Geophysical Institute, the principal scientific interests of which concentrate on study of processes taking place in the Earth's ionosphere and magnetosphere, is Czechoslovakia's second base institute for space research. As a result of research conducted by this institute, together with scientists from the GDR and USSR, on the Interkosmos-2, -8, and -10 satellites, night equatorial anomalies were detected in the distribution of ionized electrons at altitudes above 900 km. Interesting data were also obtained in the area of investigation of the electromagnetic linkage between the magnetosphere and ionosphere.

Representatives of both institutes, as well as the University of Prague, took part in preparing a Soviet-Czechoslovak experiment carried by the Interkosmos-3, -5, and -14 satellites, to study radiation in near-Earth space and the linkage of dynamic processes in the Earth's radiation belts. The results were synthesized, and the authors were awarded a joint prize of the USSR and CSSR academies of sciences for their contribution to the development of modern science.

Instrument engineering, which is highly developed in Czechoslovakia, became one of the prerequisites for development within the framework of the Interkosmos Program of a Uniform International Telemetry System (EMTS), which made it possible to standardize the process of transmitting scientific information from orbiting satellites to the Earth and substantially to speed its primary processing. The system proved fully effective and, beginning in 1976, became a regular component of hardware carried on satellites launched in the international program. It served as a prototype for a Information Collection and Transmission System (SSPE), which constitutes a complex aggregate of satellite-borne and ground equipment designed to study land and ocean resources. A considerable contribution toward this project was made by Czechoslovak engineers and technicians from the TESLA Production Association as well as other Czechoslovak scientific and industrial organizations.

On 24 October 1978 the 18th Interkosmos satellite was launched into Earth orbit. With this satellite scientists from six countries, including Czechoslovakia, conducted a combined scientific experiment to investigate the nature of the electromagnetic linkage between the Earth's magnetosphere and ionosphere, as well as the peculiarities of propagation and interaction of low-frequency radio waves in the ionosphere-magnetosphere plasma. Magnetic and electric fields and the parameters of the polar ionosphere connected with the action of fluxes of cosmic radiation were investigated during this experiment.

Up to 14 November 1978 Interkosmos-18 carried the first Czechoslovak artificial Earth satellite, which bore the name Magion. It was separated from Interkosmos-18 by Earth command. Then for a period of 2 weeks an experiment was conducted to study the space-time structure of low-frequency electromagnetic fields in the ionosphere-magnetosphere plasma (hence the name Magion) by the method of synchronous measurement of the same parameter at two different points in space. The satellites gradually separated by a distance of 1,000 kilometers. Magion then continued work in space on its own individual program.

Magion, the first Czechoslovak satellite, was designed and built with the assistance of a number of Soviet scientific institutes and organizations. The scientific apparatus and supporting equipment it carried was capable of operating in the vacuum of space. Solar batteries made in the Soviet Union supplied Magion's electric power. Czechoslovak instruments are also operating satisfactorily on Prognost satellites, launched in the Soviet national program, and an X-ray photometer, designed and built at the CSAS (Astronomical Institute), has become a regular instrument on all satellites of this series. Is this not an indicator of quality both from a scientific and technical standpoint?

Czechoslovak specialists are also taking part in medical-biological experiments on the Cosmos satellites.

The complexity of investigations is increasing and the range of investigations broadening each year in the Interkosmos Program. Czechoslovak representatives continue to occupy vanguard positions in this work. Highly complex combined experiments to investigate magnetosphere-ionosphere linkages, active wave and plasma processes, interplanetary and Earth-adjacent shock waves are presently in the preparation stage with their most active participation. Engineers and technicians are working on designing and building new instruments.

Planetary research is developing at an intensive pace. Czechoslovak specialists are building unique equipment for one of the most complex and interesting projects of the present day -- Venus-Halley. Scientists are also working fruitfully in the area of space materials science. Specialists at the CSAS Institute of Physics, working in close contact with Soviet colleagues, are developing specifically for the cooperative program general-purpose apparatus for conducting experiments in the area of producing various materials in conditions of weightlessness.

Fruitful and purposeful activity on the part of Czechoslovak scientific and industrial organizations and enterprises made possible a flight into space by a citizen of that country. In the spring of 1978 Czechoslovakia became the third country in the world to send an emissary into space. The Soviet-Czechoslovak

crew remained 7 days in orbit. The mission program included experiments in the area of space biology and medicine (Khlorella [Chlorella], Kislorod [Oxygen], Teploobmen-2 [Heat Exchange 2] and Opros [Questionnaire]), space materials science (the Morava series of experiments) and space physics (Ekstinktsiya [Extinction]). In addition, the international crew took movies and still photographs, and made visual observations of the Earth's surface to study the environment for the needs of science and the economy. A. Gubarev and V. Remek returned to the Earth on 10 March, having successfully completed the entire mission program.

The joint mission by Soviet cosmonauts and a Czechoslovak cosmonaut ushered in a new stage in the investigation and utilization of space, conducted in a planned and orderly manner for peaceful purposes by the nations taking part in the Interkosmos Program. Collaboration by scientists and cosmonauts of the nations of the socialist community constitutes vivid evidence of the fraternal relations among the socialist countries.

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## HELICOPTER SQUADRON POLITICAL OFFICER WINS PRAISE

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 1, Jan 84 (signed to press 2 Dec 83) pp 30-31

[Article, published under the heading "Into Competition," by Candidate of Technical Sciences Maj Gen A. Zhuravlev: "...Fame Will Find You"]

[Text] In the course of my job I frequently get together with Lt Col Vladimir Fedorovich Kopchikov, who is enrolled at the Military-Political Academy imeni V. I. Lenin. One immediately takes a liking to this reserved officer of neat appearance.

Vladimir Fedorovich is the son of a workingman. His father fought in the Great Patriotic War. Sgt Fedor Kopchikov walked hundreds of kilometers through combat zones as commander of a regimental reconnaissance squad. He was wounded several times, but returned to the line. He was awarded the Order of the Red Star, the Order of Glory, 3rd Class, and medals. Today party member Fedor Pavlovich Kopchikov is employed as a dispatcher in a railway administration.

The father often told his son about the war, about the accomplishments of the men of his regiment, and about how our fighting men stormed the positions of the hated foe with valor and courage. These stories became imprinted in Vladimir's soul. He developed a strong love of the military from childhood. Therefore after completing his compulsory military service he enrolled in the Syzran Higher Military Aviation School for Pilots. How pleased he was when graduation brought officer's shoulder boards!

The young officer's very first efficiency report noted that he was hardworking, efficient, of a placid disposition, carried out his superiors' orders and instructions precisely and without delay, and responded in the proper manner to rebukes. Vladimir has a highly developed feeling of mutual assistance. He is able to maintain his composure at a time of danger and promptly comes to the aid of others when they are in trouble.

The development of this young pilot took place under the tutelage of wise mentors. One of them was helicopter squadron navigator officer N. Kondrat'yev. He not only knew his job thoroughly but also deeply understood people and had the ability to instill confidence in them before taking off on an important

mission. Nikolay Vasil'yevich was respected in the subunit for his fair and just demandingness and his solicitous attitude toward his subordinates. Kondrat'yev always spoke in a straightforward and party-minded firm manner about errors committed by his fellow soldiers. At the same time he was very considerate toward the young aviators and endeavored to help them quickly take their place in the line unit.

On numerous occasions Vladimir Kopchikov heard the squadron commander say to the squadron navigator: "Nikolay Vasil'yevich, the new men are grateful to you for helping them grasp the finer details of flying over featureless terrain. You are our best man in this department...."

Kondrat'yev considered it his duty to teach the young aviators to perform navigator computations quickly and accurately, especially when flying in an area containing few recognizable landmarks. Lieutenant Kopchikov also quickly gained a solid mastery of the science of navigation. He liked the way Nikolay Vasil'yevich conducted training classes. Kondrat'yev was greatly respected by the men of his regiment, and the squadron Communists repeatedly elected him party buro secretary.

"I also owe a great deal to section commander Capt Viktor Vasil'yevich Negin," recalled Kopchikov.

Officer Negin is warmhearted, unselfish, modest, and totally dedicated to his job. He tolerated no unimaginative stereotype or routine in training aviation personnel. He was strict toward those who had a cavalier attitude toward carrying out flight assignments. Kopchikov once heard this experienced, demanding commander say something which he has never forgotten: "You can't go blind into battle; you must know your adversary well, and you must have the ability to maintain self-control and composure in order to act with certitude!"

At that time the young men did not yet grasp the great potential of the helicopter, what it was capable of accomplishing above the battlefield, when troops were attacking or defending in mountain terrain, attacking the "aggressor" in deep gorges, on clifftops, and in other places which are difficult of access. The new men were proud when the section commander went up with them. From him they learned to fly a helicopter, the ability to hit ground targets on the first pass, using all the helicopter's weapons. Negin never bragged about his successes and always evaluated the achievements of his men in a party-mindedly rigorous and demanding fashion.

Vladimir Fedorovich was fortunate to have such people. He knew, however, that no matter how wise and gifted instructors might be, a great deal depends on the individual. And he made an effort. He studied hard to master the equipment and became acquainted with helicopter tactics abroad and in local wars unleashed by the imperialists. He devoted much attention to studying the legacy of the founders of Marxism-Leninism and the fundamentals of military education science and aviation psychology. At that time the officer had no inkling that later he too would be performing political worker duties.

Goal-directed, energetic, possessing a sense of the new, party member Kopchikov soon became a first-class combat pilot. Starting as a navigator-pilot, he later became an aircraft commander, and soon made section commander. He was cited for his diligence and serious attitude toward performance of duty, and he received repeated commendations for his success in training. Kopchikov's men time and again emerged winners in socialist competition. The squadron commander cited this vanguard officer as an example to others. Others closely scrutinized him, endeavoring to learn from his experience and know-how in training and indoctrinating aviators.

The squadron deputy commander for political affairs, Capt A. Lyakhovskiy, also followed Kopchikov's successes with unconcealed pride. He liked this officer's hardworking nature, modesty, and erudition, his firmness and integrity in discussing matters connected with improving the political, military, and moral indoctrination of aviation personnel. He saw the respect this section commander's men had for him. Gradually he came to the conclusion that in the future Kopchikov could become a fine political worker-pilot. He had what it takes. He therefore recommended to his superior that this vanguard officer be appointed squadron deputy commander for political affairs. And he was correct in his assessment.

Vladimir Fedorovich rapidly found his place in the new outfit. He and squadron commander Vasil'y Vasil'yevich Shcherbakov got together and discussed how better to accomplish the assigned task and how to utilize socialist competition more effectively to develop skilled and courageous helicopter crewmen. At the time neither the commander nor the political worker had the slightest inkling that they would be performing a most important mission for the homeland as part of the limited force of Soviet troops in the Democratic Republic of Afghanistan.

Both were experienced combat pilots by that time. They had repeatedly been assigned difficult missions. Once a group of people were in distress in the mountains at an elevation of almost 3,000 meters. They were located rather quickly -- they had a locator beacon with them. The party to be rescued was on a steep, tree-covered mountain slope. How could the extraction be accomplished?

"Request permission to pick them up while hovering," Shcherbakov radioed to his ground control.

Ground control gave its approval. They knew Shcherbakov's level of proficiency and had faith in his skill. For those dangerous but flawlessly executed flights Shcherbakov was awarded the Order for Service to the Homeland in the USSR Armed Forces, 3rd class.

The deputy commander for political affairs was the commander's equal in flying skill. They understood each other well, and their friendship grew stronger with each passing day. This had a positive effect on morale in the squadron and on the men's development as combat helicopter crewmen. Both of them worked indefatigably, dedicating themselves totally to the job at hand. It was as if they had a presentiment that in the not too distant future they would be taking a real examination, which would test their character, will, flying proficiency, readiness and willingness to perform with selflessness in extreme conditions.

Party members V. Rushinskiy and V. Batsura actively assisted V. Shcherbakov, V. Kopchikov, and the section commanders in getting the squadron running smoothly and in boosting the proficiency of the helicopter crews. Principal attention was focused on developing excellent moral-fighting and psychological qualities as well as follow-through in the aviation personnel, developing in them the ability fully to utilize the capabilities of their rotary-wing aircraft. There were many first-class combat helicopter pilots in the subunit. They included Capts A. Ustimenko, V. Obolonin, V. Murmantsev, Ye. L'vov, and L. Tukarev. It was necessary to ensure that the rest of the men in the squadron developed equal proficiency.

The aviators encountered not only success and joy on the road toward this goal. And how important it was not to give in to momentary weaknesses, to overcome one's deficiencies, to display firmness of spirit. The deputy commander for political affairs' support was of enormous importance in this.

Sr Lt Tech Serv P. Tkach was assigned to temporary duty on one of the crews. At first he conducted himself in an unworthy manner. On one occasion he consumed alcohol prior to completing maintenance procedures. This incident upset the entire outfit. Tkach's conduct was discussed at a meeting of the Komsomol Buro. The deputy commander for political affairs also spoke with him.

The young officer realized his mistake.

"I let my crew down, comrade captain," he said. "I am prepared to answer for my misdeed."

The question was whether they should remove the flight technician from his position. Party member Kopchikov and the squadron commander, taking into consideration the fact that this was Komsomol member Tkach's first misdeed and that he displayed a serious and responsible attitude toward servicing and maintaining his helicopter, decided against such an extreme measure. Severe punishment was meted out to the flight technician, it is true. Tkach soon regained his good name.

Officer Kopchikov sees his duty as demanding, persuading, and influencing people with the word of the party. He worked hard and persistently to prepare himself and his men for severe tests, and such a day finally arrived.

One day as he returned home from duty, Vladimir Fedorovich informed his wife: "They're sending me off tomorrow on TDY."

"Where? And for how long?" Valentina Mikhaylovna asked in alarm.

"I don't exactly know...."

Valentina Mikhaylovna guessed where her dear husband was being sent. She had learned a great deal during the years of her husband's military service, including the ability to wait patiently.



...Things were really busy at the unfamiliar airfield. Aircraft were taking off constantly, day after day. The character of Soviet aviators, their humanism and staunchness, their courage in carrying out their internationalist duty were revealed even more vividly in this situation.

Once it was necessary to make an emergency delivery of bread, water, and medical supplies to fire victims. This mission was assigned to party member Kopchikov's crew. And they accomplished the mission brilliantly, although it was a very difficult one. Neither the complex situation nor the mountain terrain kept the aviators from honorably accomplishing the assigned mission.

After such missions Vladimir Fedorovich usually walked around and talked to the men. He would converse with some, give advice to others, and help others ready the helicopters. He discusses world events and asks the men what they hear from home.

Officer Kopchikov, squadron deputy commander for political affairs, inspired the men to new successes by personal example and impassioned party word. And he himself found solid support in the men and became charged with their energy and know-how.

The deputy commander for political affairs flew more than 500 training and combat sorties at the new location. On each one he proved to be a skilled air warrior and wise indoctrinator. Publicity of the achievements of the leading crews and dissemination of the know-how of the best aviators was organized in the subunit at officer Kopchikov's initiative.

Lt Col V. Kopchikov's military labors were properly honored by the homeland. This officer was awarded the Order of Lenin and the Order of the Red Banner. He is working persistently to broaden his ideological-theoretical and military knowledge and is training at preparing to become a highly-qualified political worker of our glorious Air Forces.

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## IMPORTANCE OF INSPECTING COMPLETED MAINTENANCE OPERATIONS STRESSED

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[Article, published under the heading "Constant Attention to Flight Safety," by Capt A. Kapelyush: "Safety Factor. Of What Does It Consist?"]

[Text] As is indicated by the practical experience of combat training, every aviator, in order successfully to carry out his duty as an armed defender of the homeland, must not only possess profound knowledge of theory but also have the ability to apply that knowledge in practice -- in the process of maintenance and combat employment of fixed-wing and rotary-wing aircraft. There are no and can be no so-called trivial matters in this area, for even the most profound knowledge of theory and solid skills lose their value if a specialist makes even insignificant departures from the requirements of the appropriate guideline documents. An unconscientious, negligent attitude toward one's duties, wandering of attention, as well as excessive self-assurance can be the cause of an air mishap.

Once while inspecting the quality of performed procedures following maintenance work on a helicopter, WO A. Konovalov discovered a radio compass malfunction. He determined that in mounting the instrument the mechanic had switched places on two high-frequency connectors, and the compass was giving readings with a 180 degree error. Let us assume that this would not be noticed when the helicopter was returned to the squadron from the technical maintenance unit. When flying in the vicinity of his own field, where every bush and tree is familiar, as they say, the pilot would immediately spot the error. But how about a flight over unfamiliar terrain?

The mechanic had a good reputation and unquestionably had performed that operation many times. What was the problem? The fact is that the mechanic had been careless. This is the potential result of diminished technical vigilance and failure to observe the mandatory sequence of maintenance job procedures. The conclusion is that any operation, even the most customary and routine operation, must be performed with as much diligence and conscientiousness as the very first time it was performed, regardless of the experience, seniority, and prestige of the person involved. This was clearly and unequivocally articulated at subunit party and Komsomol meetings and at an officers' work meeting, at which deficiencies in aircraft servicing and maintenance were discussed.

Conscientiousness, honesty and integrity are inseparably linked with a strong feeling of responsibility for the assigned job.

An oil spot was discovered during inspection of a helicopter in the technical maintenance unit following maintenance on the radio. It would seem to be a trivial matter: take a rag and remove it. They did so, but that did not end things, for the presence of oil could serve as a warning that oil was leaking somewhere in the system. The guilty parties were dealt with properly: they were made to understand that such incidents cannot be ignored. Integrity and demandingness on the part of subunit officers help prevent in advance aircraft equipment malfunctions.

"Reliable specialists," was the group leader's assessment of the professional competence of warrant officers A. Konovalov, B. Khazratkulov, and S. Samokhvalov, Jr Sgt G. Trubayev, Pvts S. Gusev, V. Gerasimov, and others. "They will not let a defect get by and will do a job conscientiously."

"Then is it not necessary to check operations after they are completed?" I asked.

The officer grinned: "Of course you have to check! We have a firm rule: trust, but verify!"

As we see, reliability here is bolstered by strict verification, and that is entirely logical. No matter how great the skill of maintenance personnel, in the final analysis there are specialists who have a better technical grasp of things. These are primarily the group chiefs, who possess considerable experience. Their quality control of performed maintenance is a dependable guarantee of safe operation of combat equipment, a distinctive margin of safety.

As a rule helicopters are carefully inspected in the squadron, with strict observance of the requirements of the manual. But it is not always possible to inspect absolutely every little detail. We know, for example, that the specialists in the helicopter powerplant group are supposed to tighten nuts to the torque specifications stated in the shop manual -- no more and no less. And the principal inspector here is the sense of responsibility on the part of the mechanic performing this operation.

Of importance in order to guarantee high-quality equipment repair and maintenance is the ability of maintenance specialists to determine the actual condition of equipment. The main job of inspection station technician WO S. Karpov is to determine in advance defects in helicopter parts and structural components. Using highly-sensitive instruments and making various analyses, he determines the degree of wear on turbine blades, helicopter blades, and draws attention to sites where metal "aging" is particularly in evidence. This requires of a specialist know-how and experience, knowledge, a strong sense of responsibility, and professional expertise.

During his years of service in the technical maintenance unit WO S. Karpov has on numerous occasions detected latent defects and prevented potential accident situations. He has been assisted in this not only by profound professional

knowledge and solid skills, but also by such qualities as composure, purposefulness, honesty, discipline, and awareness of his personal responsibility for his assigned job.

The group chief is convinced that performance of important operations on aircraft equipment should not be assigned to undisciplined maintenance specialists. Pylts A. Tolmachev and Yu. Astopovich were pulled off of helicopter servicing and maintenance for violations of discipline, although both had an excellent mastery of their occupational specialty. The group chief believes that one must earn the right to perform complex maintenance procedures.

Some commanders and activists reason as follows: "There have been no gross violations of discipline in the subunit, and therefore everything is fine. Minor violations.... These happen everywhere." This is true, but practical experience irrefutably shows that there are considerably fewer minor violations where they are not viewed as something inevitable but are combated by all methods and means. In the subunit in question everything is directed toward increasing personnel efficiency: rigorous monitoring of tool use, demandingness toward personnel on work detail, plus many other items.

Success in the air is forged out on the ground. This applies in full measure to ground maintenance specialists. Both air safety and the quality of air mission performance depend in large measure on how they have readied the equipment for a mission. Therefore many components of a pilot's success in the air are in their hands.

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## GOOD, BAD AIRCRAFT MAINTENANCE OFFICER ATTITUDES COMPARED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 1, Jan 84 (signed to press 2 Dec 83) pp 34-35

[Article, published under the heading "From a Journalist's Notebook," by Col Ye. Vetlugin: "What Path Will You Choose?"]

[Text] Upon graduating from service school, the newly-commissioned officers were traveling to their new duty assignment. Vadim Tkachev had been gazing out the train window since morning. It was a strange and marvelous sight for him to view the frothy white cotton tightly filling the brown bolls of the cotton plants covering the endless acres of cotton fields, and the heavy bunches of grapes hanging from vines in the yards of the little flat-roofed adobe houses, and the mountains of bountiful gifts from the fertile lands -- melons and watermelons at the open-air markets adjacent to the railroad stations. As they were skirting a broad, shallow-watered river, he was treated to the sight of sand dunes, dotted here and there with branchy saxaul.

"What a lot of new and interesting things!" Tkachev said with undisguised delight to his service school buddy Igor' Cherpakov, who had been gloomy and dispirited during the entire trip. "I have read a lot about Central Asia, but I never imagined that I would be assigned to duty here."

"I am afraid that in a year or so, when you find out what the score is, you will sing a different tune," Igor' skeptically replied. "I have heard that the temperature here goes above 104, and you can cook an egg in the sand in the hot sun."

"But I say it is all very interesting!"

"You would do better to give some thought to the most important thing: how can one work in such conditions? And not just a year, not just 2 years...."

"Somebody has to serve here. Why not us?"

Tkachev sympathized with his comrade: Igor' had graduated with honors and received a red diploma. He had worked hard for that! He had made great sacrifices all those years. He hoped very much that he would be allowed to choose his own duty post. But things worked out differently: they did not even

ask him his preference. "As an honors graduate, I have the right to choose, don't I?" he reminded them. "Yes, you do," they replied. "But we have received no duty assignment slots from the Kiev Military District, which you request. But they need technicians in the Turkestan Military District. In the interests of the service we are compelled this year to depart from the existing rule." There was no point in arguing: the matter was essentially settled.

At district Air Forces headquarters Cherpakov stood coldly and stiffly at attention as he was informed of the authorities' decision to send him to a fighter regiment stationed at a remote garrison on the edge of the desert. Tkachev, whom he encountered at headquarters, had received an assignment to the same regiment. At the station, after they had boarded their train, Igor' stated that he would not leave the matter at that but would appeal the school commission's decision.

"Why do you want to do that?" Vadim tried to dissuade him. "The people here also live, work, love.... Are we better than they?"

"In that case tell me why they instituted the right of choice?"

"Probably to make people study harder."

"And what is the result? They have ruined my attitude, you might say, for life."

"Take it easy, Igor', think it through carefully. I, for example, did not graduate with honors, so I can serve here. But you, as an honors graduate, for some reason cannot. Your reasoning, forgive my frankness, smells of arrogance."

Cherpakov fell silent, not knowing what to say in reply. What he had said was right! He was in agreement that honors graduates should serve here as well, but in his opinion not those who were sent against their express wishes....

They were met at the station by the unit duty officer's assistant. He led them to the square in front of the station and helped them load their things on board the UAZ truck. The officers took seats in the rear, and the truck set out. Tkachev smiled in satisfaction, grateful to the district Air Forces authorities, who had alerted the regimental authorities about their arrival. Cherpakov scowled in silence, gazing at the passing scene, while Tkachev proceeded to grill the duty officer's assistant about duty at the base and local conditions. He was not dispirited in the least upon learning that there were many difficulties, particularly now, with the young pilots being retrained on an aircraft which was new to them and that housing and living conditions were not too great; they simply did not have time to put things right.

They drove out of town, and the UAZ turned off the highway onto a dirt road. They soon passed the main gate and stopped in front of the bachelor officers' quarters. The lieutenants were met at the entrance by a deeply-suntanned officer of modest stature -- the regimental deputy commander for political affairs.

"Welcome to the regiment!" he boomed out in a deep bass, shaking the officers' hands in turn. "Let's go, comrades. We'll help you get squared away. It's not the Ritz, but I've seen worse."

It was evident that they were about to make repairs on the building. There were piles of cement and lime. Whitewash had been removed from the walls in many places, and the floor was littered with rubbish. Construction dust coated every surface in the narrow, quite empty room into which they were ushered.

"Is this our quarters?" Cherpakov exclaimed in surprise, looking about him.

"Yes. What's the problem? You don't like the fact that it hasn't been cleaned?" a note of apprehension crept into the voice of the deputy commander for political affairs. "Unfortunately the maid quit. We don't have anybody to take her place yet," he smiled, and made an attempt to relax the tense atmosphere. "The main thing is that for a while you will have a place to stay. If you pitch right in you'll have the place spruced up in no time...."

The officer gave orders to a warrant officer who appeared on the scene to prepare bedsteads, mattresses, bed linen, to scare up some furniture and, expressing regrets that he was pressed for time, left.

In spite of his characteristic optimism, Tkachev also became despondent. "Could Igor' be right? So this is how they run this place!" he silently directed his gaze around the room. "But something has to be done." He changed his clothes and left the room. In the washroom he found a well-worn brush, a rag, and a bucket. He filled the bucket with water and went back to the room.

"Here, Igor', start sweeping," he handed Cherpakov the brush. "I'll clean the windows, the windowsill, and wash the floor."

"I am no charwoman!" retorted Cherpakov, tracing an intricate figure on the dust-covered floor with his foot. "They could have cleaned the place up for our arrival. They could have detailed some enlisted men."

"You got plenty of practice policing the barracks at school. Have you already lost your touch?" Vadim looked at him with a smile. "Don't waste time, get going."

In half an hour the room was bright, clean, and fresh. Soon they brought a wardrobe, beds, a table, chairs, and nightstands. As the day came to an end, the young officers were visited by the deputy commander for political affairs. He was amazed to see a room transformed.

"How about that! I like it. Everything clean and shining. Looks quite different! And now, comrades, let's head for the mess hall. Have supper, get a good night's sleep, and in the morning report to the regimental commander."

The following day Lieutenants Technical Service Tkachev and Cherpakov, designated aircraft technicians, were presented to the regiment. They then headed out to the airfield accompanied by the squadron deputy commander for aviation engineer service. Under the watchful eye of the flight technical maintenance unit chief they proceeded to inspect fighters serviced by warrant officers prior to their arrival.

The people in the regiment paid solicitous attention to the young technicians. The squadron engineer, the flight technical maintenance chief, and other experienced officers endeavored to help them master their new job. Cherpakov, who had a better knowledge of theory, was the first to pass the tests to be cleared for unsupervised fighter servicing and maintenance. Tkachev was given several additional days to prepare. Finally he also was cleared. They proceeded with the daily airfield routine. The lieutenants were so busy with work all day that when they returned at day's end to the BOQ they were too tired to engage in their customary conversations. Cherpakov even stopped remembering his cause for resentment -- he was too busy. Gradually, however, they became accustomed to their new life and made new friends and acquaintances.

One evening Cherpakov, heading for the truck which would carry them back to their quarters, did not see Tkachev among the technicians and mechanics. He was surprised: What could be keeping him? Perhaps he was working on an aircraft malfunction? It was almost morning when Tkachev arrived home. He fell asleep and was dead to the world when Igor' left for work. Having slept a couple of hours, he had breakfast and headed back to the airfield. Cherpakov was surprised to see him on the ramp: "Didn't they give you permission to get some rest?"

"They did. But how can I rest? I've got an engine which is heating up, and nobody can figure out why."

"Don't sweat it!" grinned Igor'. "Let our supervisors worry about it. It is their concern, not yours. If they pull the fighter off the flight schedule, that's less work for you."

"I said the engine is heating up! Do you understand what I am saying? If it overheats, we'll have an engine failure, and we'll have to pull it. It's no joke to ruin a new engine!"

"I don't get you," commented Cherpakov. "You're a strange one. You are pleased as punch when you get a duty assignment way out in the desert in the middle of nowhere. You have more work to do than you can handle, and you are happy about that. And now this engine...."

"Shame on your parents for bringing you up this way," smiled Tkachev and, briefly falling silent, added: "But seriously.... You know what bothers me, Igor'? The engineers can't figure it out. The aircraft is new not only to the pilots but to the engineers as well. They are not thoroughly familiar with it. I have a few hunches...."

"It's your business," Cherpakov reluctantly agreed. "But I personally wouldn't complicate my life like that."

Tkachev spent 2 more nights on the aircraft with the engineers. He grew thin, with sharpened cheekbones and sunken eyes. Suddenly Vadim, radiating joy, walked up to Cherpakov, who was readying his aircraft.

"What are you beaming for?" Igor' looked at him. "Do you have a winning lottery ticket?"

"Much better than that!" Tkachev laughed. "You know what the problem was? There was a fuel feed control malfunction. But in addition, the automatic control system was cutting in with a delay, and the ignition system also. As a result the engine was overheating. And who was it that figured it out?"

"You mean you did?"

"Partly. But the fact is that we got to the heart of the problem through joint effort. We have checked it out a dozen times. And everything checks out! We found the cause! They're sending people from the factory to make adjustments...."

Tossing a screwdriver in his hand, Cherpakov was half listening, experiencing mixed feelings.

"I have news also," he said with a forced smile. "I have received a reply from Air Forces Headquarters to my appeal."

"What did they say?"

"Well!" Cherpakov frowned, as if he had a toothache. "Do you think they're going to countermand a decision by the school authorities? The same old song and dance. Just rephrased." He fell silent, uttering a deep sigh, and then said, in a hollow voice containing a note of resentment: "They don't appreciate my efforts or ability. But I don't intend to let it rest! I'm going to write another letter! In the final analysis I am not the only one to suffer. for they are undermining the very idea of working hard to achieve outstanding results."

Vadim looked at him pityingly: "Igor', one of us has the wrong idea about things. Do you think people study hard and get good grades in order to be able to choose a nice, comfortable duty station? The knowledge one acquires is needed first and foremost for one's job, for high-quality aircraft maintenance!"

"Then why did they promise?"

"You just won't give up! Can't you see that one's career prospects are not determined by where one's military service begins. The main thing is how it begins, a person's attitude toward his assigned job and toward increasing his job skills. We are young, with the future before us. I am confident that we shall remember with fondness the years spent out here."

"Perhaps there are other idealists such as you. But I am not one of them. For me this is nothing but bitter memories."

"Look here, Igor', with that attitude you won't do well in the service. It won't take long to get a bad reputation, although you are certainly very capable. Stop your bitching and complaining. Just do the best job you can."



"They haven't made you a deputy commander for political affairs by any chance, have they? This is part of their job. Why are you trying to be a moral instructor?"

...Retraining over to the new aircraft was gradually being accomplished. Life at the airfield was becoming increasingly busier. There was an appreciable increase in work load not only on the equipment but on the men as well. Igor', concealing his deep resentment, couldn't wait to go off duty in order to get away from the excessive concerns of the job. Vadim, on the contrary, seemed only now to be experiencing total happiness. He was indefatigable during flight operations. and when he returned to the BOQ he did not visit technician acquaintances, as Cherpakov often did, but studied textbooks and manuals late into the night. And it was not that he was rereading the aircraft shop manual or technical description, but was poring over intricate diagrams of electronic equipment and aircraft armament. At the field, when his aircraft was in the air, he would talk with specialists on technical matters and was gaining experience and know-how.

One evening Cherpakov, picking up a book on radio engineering from the table, casually leafed through it and, throwing Tkachev a derisive glance, asked: "What do you need this for? You are an aircraft technician, not a radio specialist."

"So what? Knowledge never hurt anybody," Tkachev calmly replied.

Frowning, he fell silent, not wishing to get into a heated debate. Cherpakov also fell silent: he too was tired of arguing his point of view.

A year passed. Replacements arrived at the regiment -- several graduates of that same aviation technical school. Tkachev volunteered to take two of them under his wing. He helped them become familiarized with their duties more rapidly, and he cautioned them against mistakes. In the regiment he was now considered an old-timer, an expert on the supersonic combat aircraft. And indeed, he had amassed a great deal of knowledge and had earned respect, especially after that incident with the engine. Even those who had been in the service 10 years or more did not consider it beneath them to discuss various technical matters with him as equals.

Involuntarily submitting to the universal acknowledgment of his authority, Cherpakov somehow came to terms with the fact that Tkachev had advanced to a position of prominence. He no longer reproached him for excessive diligence, but merely expressed amazement at times about how he managed to display such stick-to-itiveness. He himself did a fair job performance: he received neither chastisement nor deserved special praise.

When the time came, both were promoted to the next higher rank, and by the same official order.

"Well, Vadik," Cherpakov grinned, "fate has made us equals. You bust your guts, like I once did, scrambling up the ladder of achievement. And what is the result? Both of us get promoted to senior lieutenant. That's the way it goes, buddy. You can't get ahead of the pack...."

"Not that again, Igor'! Ranks, job titles.... Is that really the point? What about reputation and respect? And what about moral satisfaction?"

Meanwhile life in the regiment went on: some people were transferred, and others were promoted. The flight technical maintenance chief was promoted to a higher position in the technical maintenance unit. To Cherpakov's surprise, Vadim Tkachev was nominated as his replacement. This hurt Cherpakov's pride, but at the same time he realized that the decision was fair and just. When the promotion order was read, Igor', as Vadim's friend, was one of the first to congratulate him on his appointment.

It seemed that nothing had changed between them, but nevertheless a change had occurred. Cherpakov felt that he was a subordinate and that Tkachev was his superior. And he could not help but wonder how it had happened that he, an honors graduate who had shown such promise, ended up to the rear? After all, Vadim had not displayed any particular brilliance of ability either at school or in the regiment.... "Life is giving me a raw deal," Igor' sighed.

The friends had a falling out during the very first preparations for flight operations. Entering the shelter where Cherpakov's fighter stood, Senior Lieutenant Technical Service Tkachev asked in a kindly yet at the same time somewhat official manner: "How are things going here with you [you -- vas, pronoun of formal address]?"

Cherpakov stiffened: vas! This was something new! He was about to fly off the handle and remind Tkachev that for many years they had been friends and employed the familiar form of address with one another, but he swallowed his resentment. Endeavoring to remain calm, he replied: "Preparation almost complete. All that remains is to fill in the documentation...."

For Tkachev the interests of the service were more important than personal relations. And he, feelings of friendship for Cherpakov notwithstanding, proceeded to inspect his aircraft in a very rigorous and faultfinding manner. Completing his inspection, he stood up and frowned: "Igor' Petrovich, why didn't you clean off the struts? There is still mud on them from the last flight operations. The pistons have not been cleaned or greased. Correct the problem...."

Cherpakov's face turned crimson. He was fully aware that he had been lazy. It is true that he could have the mechanic do it, but for some reason he had not done so. He had not expected the new flight technical maintenance chief to give him a hard time, and now he was ashamed that he had expected his friend to give him a break. Unexpectedly he blurted out: "Very well, comrade senior lieutenant, it will be done!" Sensing that with this he had acknowledged defeat, Igor' became embarrassed, was silent for a moment, and then added in a calmer, more restrained voice: "I shall be no cause of embarrassment to you."

"Excellent!" Tkachev nodded his head and strode toward the adjacent shelter to inspect the flight's last fighter. He realized Cherpakov's emotional state and walked off without looking back at Igor', who stood pensively gazing at him.

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## RADIO COMPASS DEVIATION PROCEDURES SIMULATOR

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 1, Jan 84 (signed to press 2 Dec 83) p 36

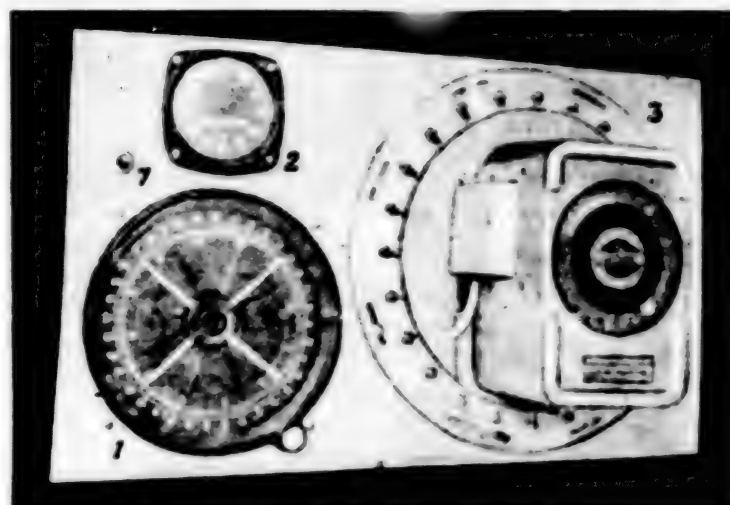
[Article, published under the heading "The Reader Suggests," by military navigator 1st class Maj (Res) A. Kiselev: "Correcting ADF Error"]

[Text] Correcting compass deviation on an aircraft is a complicated job. It requires a clear picture of the processes taking place and a precise sequence of operations with the navigation system equipment and monitoring instruments. There are certain difficulties in training specialists to perform such procedures correctly on an actual aircraft, and in addition one is using up service life on costly systems. Therefore it is advisable and economically advantageous to hone skills in performing radio deviation correction procedures on a simulator, which can easily be built right in the unit. With such a simulator one can in particular practice correcting loop antenna and compass repeater setting error, determination of magnitude of ADF deviation error, error compensation and final adjustment, determination of residual radio deviation error, and preparation of a compass deviation card.

Training is done according to the method described in the manual for performing ADF deviation procedures on fixed-wing and rotary-wing aircraft, or following the abbreviated method described below.

The simulator device consists of an electronic-mechanical device, built either in a stationary or portable version. It includes a course setting knob (ZK), ADF deviation simulator (IR), synchro-selsyn repeater (SP-1), amplifier (U-1), radio compass deviation compensator, pilot's and navigator's needle indicators, and power supply. It is pictured in the photograph below. Figure 1 contains a block diagram, and Figure 2 a schematic diagram.

With switch 7 we set the navigator's needle indicator scale to course MK [magnetic course]=MPR [ADF magnetic bearing]-KUR [relative bearing of radio station], where KUR is a multiple of 15° (0, 15, 30°, etc). The USh-1 course card is mechanically linked to the ADF deviation simulator. From the latter a signal proportional to  $KUR - \Delta R$  is applied to the synchro-selsyn repeater, the error signal is applied to the amplifier input and, after amplification, is applied to the loop antenna motor (D2), which turns the loop antenna and the



Key:

- |                                       |                              |
|---------------------------------------|------------------------------|
| 1. USh-1 navigator's needle indicator | 3. ADF deviation compensator |
| 2. SUP pilot's needle indicator       | 7. Push-button switch        |

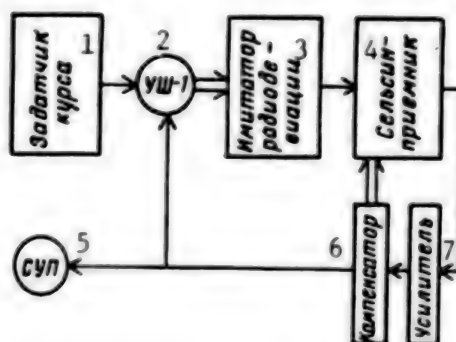


Figure 1. Block Diagram of Simulator

Key:

- |                            |                            |
|----------------------------|----------------------------|
| 1. Course setter           | 4. Synchro-selsyn repeater |
| 2. USh-1                   | 5. SUP                     |
| 3. ADF deviation simulator | 6. Compensator             |
|                            | 7. Amplifier               |

synchro-selsyn repeater rotor to an angle equal to  $KUR - \Delta R$ . Radio deviation  $\Delta R$  is compensated with the mechanical compensator according to the prescribed procedures. A signal proportional to the angle  $+KUR$  is taken from the compensator synchro-selsyn repeater and applied to the pilot's and navigator's needle indicators. An angle equal to  $KUR$  is set on these indicators.

Practical experience indicates that the proposed simulator increases effectiveness and quality of training and makes it possible to simulate ADF simulator of various types of aircraft, objectively to grade a trainee's performance, and substantially to reduce the laboriousness of radio deviation procedures. In





## INTERPRETING FLIGHT RECORDER INDICATED G-LOADS

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 1, Jan 84 (signed to press 2 Dec 83) p 37

[Article, published under the heading "The Reader Suggests," by Capt M. Kanarskiy: "G-Loads During Maneuvers"]

[Text] When flying training sorties in the practice area and over the range, a pilot devotes considerable attention to enduring G-loads. During recovery from a dive at the range, for example, depending on the mission, he is taking from a 3 to 5 G-load in the third second. When the flight recorder data is analyzed, however, the normal load factor values differ from the accelerometer readings by 0.5-1.5. Such discrepancies are caused by design and structural differences between the accelerometer and flight recorders and by the differing placement of sensing devices on the aircraft. All this hinders a subsequent high-quality verification of execution of the scheduled mission, and consequently does not promote precise observance of mission safety conditions.

In order to increase the reliability of flight recorder data, one can prepare special normal load factor calibration scales. In plotting them one utilizes the data on the SARPP-12 cartridge accompanying label, a ruler, and an EDI-452 interpreter, and SARPP flight recorder tapes. Two scales are prepared: one for interpreting sharply-peaked G-loads (Figure 1) and the other for gradually-applied G-loadings (Figure 2).

Determine with the ruler the ordinate of the maximum G-load, from 1 to maximum, in millimeters (figures 1, 2), and divide it by the accelerometer readings minus 1. Plot the result on the appropriate scale from 0 for each unit of G-load upward to +10 and downward to -3.

For example, on the first and second flights (with sharply-peaked and gradually-peaking G-loads), 6-G loadings were generated. We know this from the accompanying label filled in by aircraft equipment specialists on delivering the SARPP-12 cartridge to the flight recorder data team. Measuring the ordinate of the G-load from 1 to maximum, we obtain 7.5 cm on the first tape, and 6 cm on the second. We then divide these values by 5 (6-1). Thus on the first scale (for a sharply-peaked G-loading) we plot at 1.5 cm and on the second at 1.2 cm from zero per G (figures 1, 2).

Prior to interpreting the results we must determine how many Gs (gradually-peaking or sharply-peaking) were pulled during execution of the maneuver. Only after this do we use the corresponding scale. An additional column is provided in the flight recorder data analysis log, in which we enter the normal load factor interpretation data.

Flight Recorder Accelerometer

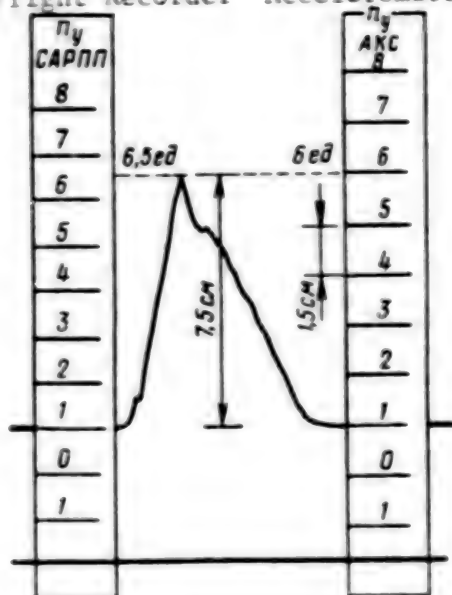


Figure 1. Sharply-Peaking G-Load

Flight Recorder Accelerometer

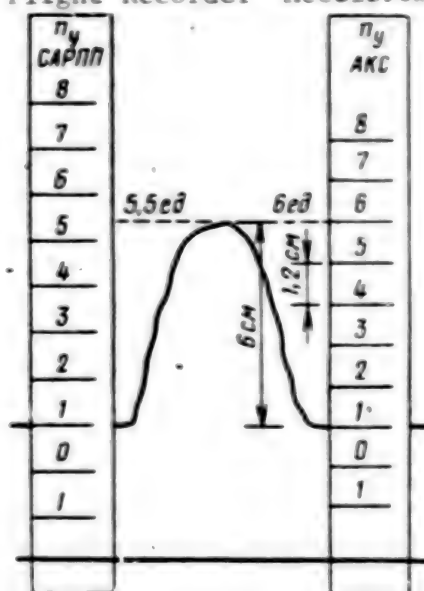


Figure 2. Gradually-Peaking G-Load

One notes on the SARPP-12 tape that with sharply-peaked G-loadings the trace peaks higher than with gradually-peaking G-loads, although the load factors are identical (according to the accelerometer). This indicates that in the former instance the SARPP overstates the accelerometer readings and in the latter instance understates them. Interpretation of the tape utilizing a calibration diagram indicates that the G-load on the former will be approximately 6.5, and 5.5 on the latter, although the pilot pulled 6 Gs.

Employment of special scales to interpret normal G-loadings makes it possible more accurately to analyze flights with the aid of flight recorder data.

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## AIRFIELD TECHNICAL INSPECTION POST DESCRIBED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 1, Jan 84 (signed to press 2 Dec 83) p 38

[Article, published under the heading "Constant Attention to Flight Safety," by Capt A. Malashko: "Post at the Airfield"]

[Text] Dusk gradually fell over the airfield. Contrastingly-colored lights came on along the runway and taxiways. The people in the aircraft servicing area watched as a fighter taxied toward the active runway. It stopped short of the runup pad. A flashlight beam played on the fuselage and landing gear. The fighter then continued taxiing. The aviation engineer service specialists now were convinced that there would be no problems, since technical inspection post warrant officer on duty N. Vorob'yev, failing to spot anything suspicious, cleared the fighter to continue taxiing to the active.

As a matter of fact, that is the way it should be. Particularly since the overwhelming majority of this unit's aviation engineer service specialists are highly proficiency-rated and well trained. They include master-rating individuals, whose experience and know-how are studied in all subunits. They include Sr Lts Tech Serv A. Lebedev and A. Nikolayev. They have never cleared an aircraft with an uncorrected problem or failed to perform the entire list of procedures in readying a fighter to go out again.

Nevertheless each time they brief specialists designated technical inspection post duty personnel, the senior flight operations engineers enumerate their duties in detail, brief them on problems noted earlier, and remind them of the need for constant vigilance and conscientiousness when inspecting an aircraft.

This is due to the fact that the technical inspection post is an important component of the system for ensuring flight safety. In the course of his inspection, which takes only a few seconds, the specialist on duty is to make sure that there is no fuel or oil leaking from the aircraft, that no air is being released from the system, that the protective covers have been removed from the auxiliary intakes, that fuel tank caps are securely in place, etc. From my past experience as an aircraft technician I know that many aviation personnel errors can be prevented by conscientiousness and alertness on the part of the technical inspection post duty man.

Once Sr Lt Tech Serv N. Boldyrev turned an aircraft back to the servicing area because he had spotted a misalignment on the drag chute door latching mechanism. If he had failed to turn the aircraft back, the chute could have accidentally deployed during takeoff or landing. On another occasion the officer refused to clear a fighter for departure, noting that an indicator light on the landing gear was out. Of course it could have simply burned out, but it also might be indicating a malfunctioning gear-down locking mechanism.

Information bulletins received by the engineers are full of examples indicating that frequently our errors occur through the fault of the groundcrews, especially during tactical air exercises, when the maintenance people must work in severely time-limited conditions, as well as during night flight operations, and especially just before the end of night operations, when fatigue is beginning to affect personnel and one's powers of alertness weaken. This heightens the responsibility of the technical inspection post duty man, the final and most important element in the process of inspection prior to aircraft takeoff.

I know of cases where, unfortunately, duty ground personnel themselves made mistakes and were guilty of disrupting the smooth pace of a flight operations shift. Some, for example, are very slow in inspecting aircraft, while others, on the contrary, are too hasty in inspecting, as a result of which aircraft are returned to the ramp not because they in fact have a problem but because the inspector, deficient in his knowledge of the specific features of operation and maintenance of a given type of aircraft, incompetently determines the nature of some warning sign. Once WO P. Suchkov, for example, would not allow a fighter to take off. He felt that too heavy a stream of fuel was flowing from a drain tube. In actual fact it was within normal limits.

Some specialists are of the opinion that technical inspection post duty is little effective and that in the brief time allocated for inspection it is very difficult to spot a serious problem on an aircraft if one exists. One hardly need argue that such an opinion is erroneous. It is obvious. To be absolutely fair we must state that very rarely must a technical inspection post duty man return aircraft to the ramp. It is also true that an experienced maintenance technician will give no reason for criticism: he will ready an aircraft to go out again with a high-quality job and covering all procedures.

But one should always bear in mind that young maintenance personnel serve in the regiment alongside veterans. They require not only constant oversight but also solid backup. Any situation change in the course of a flight operations shift can affect the quality of aircraft servicing and maintenance. Therefore an experienced maintenance specialist at the technical inspection post may well spot a mistake or error on the part of a young maintenance technician and take the necessary steps to prevent a possible air mishap. By closely watching the taxiing aircraft, he can promptly inform the senior flight operations engineer if he notes that aircraft are taxiing dangerously close behind one another, if aircraft have run a wheel off the concrete taxiway onto the dirt, or have committed other violations which could result in subsequent engine failure.

In leading aviation outfits aviation engineer service supervisors attach considerable importance to selection of maintenance specialists to stand duty at

the technical inspection post. As a rule they designate the most highly qualified warrant officer technicians or mechanics, persons capable of spotting a problem on an aircraft from the slightest indication. Training classes and drills are conducted with these specialists.

I was present at one of these drills. Flight technical maintenance chief officer N. Chukov, holding a stopwatch, observed his men performing inspection operations on an aircraft. The drill was taking place at dusk, in conditions of limited visibility. By this time the men were quite tired after a day's duty, particularly since they had just performed aircraft readying procedures in anticipation of flight operations. Their tiredness was evident. Not every mechanic was able immediately to spot a number of items: the cockpit canopy was not securely shut or sealed, the pins had not been removed from the ejection seat firing mechanism (they should be removed just prior to a flight), and the speed brakes were not lying flush against the fuselage. The thorough critique presented following the practice drill helped the men better understand how to perform proper inspection procedures.

"Thanks to such drills the warrant officers will soon master inspection procedures. This has already been put to the practical test," I was assured by Sr Lt Tech Serv N. Chukov.

It is useful periodically to conduct such training drills. And it is important that each time the instructor analyze in detail deficiencies noted in the inspection, give a practical demonstration of how a technical inspection post duty warrant officer should perform, and hold personnel strictly accountable for errors of omission. This will force an individual to have a more serious and responsible attitude toward his duties, for the inspection post duty man works alone, away from the group. It is therefore very important that he be disciplined and skillfully monitor not only the aircraft but himself and his own actions as well.

In the regiment in question there has been a substantial decrease in the number of aircraft problems and malfunctions. I feel that considerable credit for this must go to the maintenance specialists who vigilantly perform their difficult but very responsible job at the technical inspection post during intensive flight operations.

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## INTERMITTENT RADAR RECEIVER MALFUNCTION BEDEVILS AVIONICS TECHNICIANS

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 1, Jan 84 (signed to press 2 Dec 83) p 41

[Article, published under the heading "In Aviation There Are No Trivial Matters," by Maj Yu. Andronov: "'Wandering' Defect"]

[Text] The combat aircraft was brought to the technical maintenance unit for maintenance. Sr Lt Tech Serv G. Arkhipov had just began inspecting its avionics when the avionics maintenance group chief, Sr Lt Tech Serv A. Naumov, ordered: "Gennadiy Ivanovich, please check the units in the upper bay with your lab equipment. There may be a hidden malfunction there."

Senior Lieutenant Arkhipov did not merely follow the group chief's instructions but ascertained in detail precisely what had happened. He learned the following. A pilot reported upon returning to the field that while attacking a practice target the target return began to fade from his radar screen. He promptly switched to intercept mode on the backup system. Otherwise he might have failed to accomplish the objective.

Squadron aviation engineer service specialists in the aircraft servicing area switched on the equipment and proceeded to check the circuitry in sequence. The equipment worked fine. Thoroughly warming up the equipment with all circuits energized, switching on equipment in differing sequence, examination of the flight recorder data, plus other checking methods during preliminary aircraft readying also failed to produce results.

On repeated test flights they switched on the radar sight, and it performed quite normally. The aviation engineer service specialists, in spite of the fact that pilots were bringing in excellent flight recorder data, continued closely watching equipment performance. Finally on one training sortie the problem cropped up again. The people in the squadron were concerned. But it so happened that it was about time to send the aircraft in for regular scheduled maintenance.

...Arkhipov pondered the matter. He had never encountered such a problem, although in his several years of service in the technical maintenance unit he had time and again troubleshot difficult malfunctions. Evidently what they were dealing with here was an intermittent malfunction -- one which does not

appear continuously but comes and goes. The maintenance technician began his search for the problem by testing the sight with circuits energized. The equipment functioned normally. The officer recalled that the pilots had mentioned lack of missile firing zone indication. Thoroughly familiar with the equipment circuitry, he mentally pictured operation of the coupling circuitry, where the firing zone generating circuit was located. Checking radar operation from a remote console, he noted that during lock-on of a stationary target, the speed voltage needle deflected by a greater angle than was specified in the service manual.

A subsequent check, however, failed to produce the desired results. Another day passed. By meticulous analysis and comparison of parameters on the flight recorder tape, the maintenance specialist concluded that there was a malfunction in the equipment but that it made its presence known only in a certain mode. It was being caused by an open occurring somewhere in the wiring.

Arkhipov told the engineer what he had concluded. But how could they find the open connection among the great many other electrical connections? They soon ascertained that voltage at one of the resistors was abnormal.

They ran a test. there was a malfunction! Now the maintenance specialists could be confident that their search was over. Running ahead, I can state that a test flight and testing of the equipment according to a program devised by the engineers confirmed that the malfunction had been located and properly corrected. Sr Lt Tech Serv G. Arkhipov received a commendation from the higher-echelon commander for his alertness and skill.

Aviation engineer service supervisors discussed this incident in detail with all subunit personnel, stressing that intermittent malfunctions can be promptly found only with a thorough and comprehensive analysis of pilot comments and observations.

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## SHATALOV DISCUSSES IMPORTANCE OF COSMONAUT STRESS CONDITIONING

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 1, Jan 84 (signed to press 2 Dec 83) pp 42-43

[Article, published under the heading "Cosmonaut Training," by USSR pilot-cosmonaut, twice Hero of the Soviet Union Lt Gen Avn V. Shatalov: "How Can One Overcome Stress?"

[Text] A number of articles published in the journal AVIATSIYA I KOSMONAVTIKA have examined various hardware and methods used in training cosmonauts to develop various skills and capabilities. In continuation of past materials, we should like to discuss in greater detail the psychological readiness of cosmonauts for a manned mission.

Cosmonaut activities involve primarily testing. Every manned mission as a rule marks the beginning of a new stage in the exploration of space, and the spacecraft crew must address a great many problems for the first time. Each mission attests to the courage and heroism of the Soviet conquerors of the universe, who strode into the unknown.

A cosmonaut, just like anybody else, responds to good and bad news, joys and sorrows, physical and psychological stresses. Just like anybody else, he has the ability from birth to feel presentiments of danger. If something is threatening, he feels acute tension throughout his body. This is the system's defense reaction to danger. It is called stress, which in plain language means pressure, tension.

Stress affects different people differently. Some feel the need to take some kind of action, to run somewhere. Others, on the contrary, freeze up, stiffen, lose the capability to act. Stress reactions leave an imprint on the psyche. The brain "commits them to memory." It is possible, however, to develop in oneself the ability to act differently in a state of stress -- quite rationally and intelligently.

I have experienced powerful states of stress on numerous occasions: when I went up in an airplane for the first time in my life, during a forced landing, just before my first parachute jump, and on many other occasions. But I always endeavored to suppress my feelings of fear, to overcome my emotions, and I noted that each time it was easier to maintain control of myself.

I can imagine the emotional state of Aleksey Leonov when he took history's first space walk. How much effort he expended in practice drills, and how much courage he displayed at the decisive moment! On 18 March 1965 Academician S. P. Korolev, just before launch, turned to Leonov and said: "When you're up there don't mentally dwell on the EVA, just go out and come back in."

And finally that about which only visionaries had dreamed came to pass: man walked in space. Whoever did not experience that moment together with Leonov can say today: how easy and simple it was! But how much labor was invested in training and preparing the cosmonaut, how many experts dedicated their time and energies, doing everything to ensure that man could surmount a new, as yet little studied factor of weightlessness -- the effect of supportless space! The very exit by the airlock method was a fairly complex operation. It was accompanied by a high level of emotional tension. And the best remedy against tension was an activity stereotype solidly fixed in the cosmonaut's memory as a result of numerous practice sessions.

One can easily imagine the stress state of Nikolay Rukavishnikov and Bulgarian cosmonaut Georgiy Ivanov when the main propulsion motor malfunctioned on their spacecraft. With the support and assistance of Mission Control, the crew was able to correct a malfunction of the rarest occurrence, with honor and the highest degree of professionalism.

Or take the situation in which cosmonauts Aleksey Gubarev and Georgiy Grechko found themselves during reentry. All the prescribed procedures had been performed on the Soyuz-17: deceleration burn, capsule separation. The crew was waiting for the parachute to deploy....

"I looked at my watch," Georgiy Grechko related after the mission. "It was time, but the first parachute had not deployed, nor had the second. I realized what this could mean. I was scared. What could we do? My first thought was that we had to determine the cause and communicate it to 'Zarya', in order to avoid such a situation in the future. I checked the position of the toggle switches and feverishly leafed through the manual. My heart was pounding. It was very difficult to force myself to concentrate my attention, think intelligently and, most important, to think fast. I proceeded to analyze the situation: everything seemed to be nominal. Suddenly the capsule jerked. The parachute had deployed. Later we figured out what had happened: we had simply been mistaken in our time count.... I felt a great feeling of relief, and thought to myself: 'At least I forced myself to work under these conditions.' And I was proud of this."

It is very important to develop psychological stability and reliability in a crew. I am talking about stability in the face of extreme stress and overexertion, emotional-volitional stability in the face of risk and danger, and preparedness for the unexpected. The conditions of a manned mission impose heavy demands on a cosmonaut's mental and emotional makeup. This is why so much importance is attached to psychological training and preparation. Psychological and cognitive processes are improved in the course of this training, emotional-volitional stability is developed, and knowledge, skills, and abilities are reinforced. It is carried out in a close linkage with moral-political training, which is a determining and leading component.

Study of the entire aggregate of a person's psychological traits and features is a complex process. Science is essential here, as is attested by the experience of the Cosmonaut Training Center imeni Yu. A. Gagarin.

Space psychology began to develop at the beginning of the 1960's. It studies man's activity in conditions of space flight. In recent years research has essentially been conducted in all main areas: in psychology of labor, engineering psychology, social psychology, and education psychology. A number of other subjects are also included in this group. Psychophysiology of cosmonaut labor, for example, investigates the physiological mechanisms which produce psychological and emotional phenomena and processes. It contributes toward solving problems of adaptation and controlling the state of crew members.

Today we can state that we know the mechanisms of man's adaptation to weightlessness and have determined how various physiological systems of the human organism differ in their sensitivity to adverse factors of space flight. All this enables us scientifically to substantiate the possibility of even longer manned missions.

Practical realities, however, are assigning more and more new tasks to space psychology. Take, for example, the problem of psychological incompatibility of cosmonauts. Science has not yet provided an exhaustive answer to all questions which arise with the methods specialists and experts at the training center. The crew must work for an extended period of time in an enclosed space, in unusual conditions, under the constant effect of weightlessness. Naturally psychological and emotional changes are unavoidable under the influence of factors of space flight, to which man's nerve cells react. Just what changes are unavoidable? As a result of what can antipathies arise in crew members? The mission controller, doctors and psychologists must seek answers to these questions and be alert at all times. Sometimes adjustments are made in the day's schedule, changes in the sequence of performing experiments, when the cosmonauts, let us say, become unhappy with the monotonous nature of the experiments. An aggregate of psychological support measures has been devised (this is what they call a system of social, psychological, and other measures which make it possible to attenuate in the crew members the feeling of isolation from accustomed terrestrial conditions).

Frequently two crews are working simultaneously in the orbital complex. This is a group, a small one, but a group nevertheless, and discipline, interaction, cooperation, work harmony, and good will should be integral attributes of such a group. But one should not forget about the feelings which crew members may have toward one another, mutual personality assessments and appraisals of the role which each will be playing on board the orbital complex. The various supervisors, in preliminary briefings, tactfully remind the cosmonauts of the need for feelings of mutual respect, liking, trust, and the need for a harmonious working atmosphere, for this determines not only the success of the undertaking but also determines whether stress situations are overcome.

How should a harmonious, smoothly functioning crew be selected? This is a difficult question, for each individual possesses his own life experience and his own convictions. Not only doctors and specialists but also all those involved in training cosmonauts work on resolving this problem through joint



efforts. Each of these persons must be a psychologist, observing cosmonauts during training sessions, during athletic activities, and during off-duty hours, must compare facts, and predict an individual's behavior as a crew member on board an orbital station.

A cosmonaut training system has been developed in the Soviet Union and proven over many years of practical experience. It is grounded on scientifically substantiated principles. All types of training -- flight training and parachute jumping, participation in designing and testing space hardware, training on specialized and combined simulators, in altitude chambers, in weightlessness simulation tanks, on board a flying laboratory, in the natural conditions of various climatic and geographic zones, and in sessions on the centrifuge -- constitute as an aggregate a powerful means of shaping the cosmonaut as an individual capable of performing complex, risk-containing operations during a manned space mission.

Unquestionably effectiveness of development of the requisite qualities depends on how rigid are the demands on a person's psychological and emotional responses during training activities and on a diversity of means and methods of utilizing emotional influences. On specialized and combined simulators, for example, where all elements and phases of a forthcoming manned mission are rehearsed in the fullest possible manner in an intimate interlinkage, the methods expert-operator can dial in an unexpected situation. Then the crew will have to show not only its knowledge of the capabilities and specific features of the space hardware but also the ability to make correct decisions in unusual situations. In this way we develop preparedness to encounter the unexpected, the new, and the ability rapidly to adjust to a new situation. Trust in one another is developed, as well as mutual monitoring and verification, and a unified crew is welded together. The cosmonaut gains experience in overcoming stress situations which may arise during a mission. An individual who is well trained on simulators to encounter various malfunctions and unexpected situations will not become lost in surmises and search for the correct solution during an actual flight.

Parachute jumping is an important stage in cosmonaut psychological training. A special role is assigned to parachute jumping at the Cosmonaut Training Center imeni Yu. A. Gagarin. I can state on the basis of my own personal experience that parachute jumping is an incomparable means of developing will-power, courage, and determination. During parachute jumping one develops the ability to overcome a feeling of fear, instantly to assess a situation, to act decisively in stress situation conditions, to act in a composed and highly precise manner. During those years our group made as many as a hundred jumps -- normal and delayed-opening, and onto various surfaces: land and water, forest and swamp. Although all of us had jumped at service school, each of us had a rather strong emotional reaction to jumping in new conditions, and I was not the only one to feel a strong sense of emotional excitement upon approaching the open doorway of an aircraft.

Flight training is also very useful for developing psychological readiness for a space mission. It helps one develop the ability independently to make a decision in a complex situation. An aircraft can be called a flying simulator,

in which a cosmonaut learns to control a moving object during the combined action of physical and emotional stresses. As a member of the cosmonaut corps, I learned to fly, together with a group of comrades, aircraft which were new to me -- the MiG-21 fighter and the Mi-4 helicopter. I am convinced that learning to fly new aircraft is an important element in the pilot-cosmonaut training system, for in the final analysis a cosmonaut is first and foremost a test pilot, and each spacecraft, even in the same series, has its own distinctive peculiarities, its own character. The better trained the crew members are as test pilots, the more surely and confidently they master space hardware.

One more comment in favor of flight training. As we know, manned-mission launchings are not a daily occurrence. With extended periods of time between missions (sometimes lasting years) the acuteness of an individual's reaction on encountering unexpected situations becomes lessened. Flying fixed-wing and rotary-wing aircraft as well as parachute jumping maintain this sharpness and make the mission commander and all crew members be in a continuous state of readiness for any and all unexpected situations and mission complications.

Theoretical knowledge is unquestionably essential. But in an emergency situation one needs, in addition to thorough knowledge of equipment design, construction and details of operation and maintenance, experience and skill, composure and self-control and, most important, preparedness to take action in any and all situations, preparedness and readiness to fight and win!

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## SOVIET SPACE PROGRAM COLORIMETRY EXPERIMENTS

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 1, Jan 84 (signed to press 2 Dec 83) p 44

[Article, published under the heading "Space Flight Support," by Candidate of Technical Sciences A. Tishchenko: "The Tsvet-1 Colorimeter"]

[Text] For about 300 years scientists have been seeking a way to solve many scientific and tactical problems with the employment of chromatics. Today the space program has been enlisted to help solve this problem. It is helping produce effective thematic maps of the most diversified regions in the interests of earth science and many branches of the economy. The practical significance of such projects lies in the fact that there presently exists the capability to study and evaluate the properties of many natural objects and phenomena on the basis of color criteria. This enables us to obtain, on a regular basis and as needed, information on the bioproductivity of the World Ocean, on the status of forest and grassland zones, soils, and the environment.

The first quantitative color evaluations of natural Earth terrains were made by A. Berezovoy and V. Lebedev on board the Salyut-7 station, using the ATs-1000 coloration atlas. As had been postulated, these experiments indicated that the most diversified factors exerted significant influence on results: optical characteristics of viewing ports and the atmosphere, angles of view of an object relative to the nadir and sunlight, state of the observed surface, plus others.

Alongside the coloration atlas, hand-held camera and log for recording data, the cosmonauts utilized during visual-instrument study of Earth resources a new instrument designed and built at the Priroda State Center -- the Tsvet-1 colorimeter. This instrument has a separate standardized light source and a large set of color standards. Observations are documented with a hand-held camera. Development of the Tsvet-1 made it possible to proceed with installing another system on board the orbital station -- a colorimetric system.

The system was flight-tested before going into orbit. Remote color measurements were taken from an An-30 flying laboratory with the aid of an atlas and a Tsvet-1 instrument, using a ground test pattern consisting of a set of color-standard square panels measuring from 5 to 20 meters to the side. Of course the color and spectral parameters of each panel were known. This made it possible

to evaluate the accuracy of visual colorimetric means. Then cosmonauts were given theoretical and practical training in the air to develop skills in working with the atlas and the Tsvet-1 instrument. Training flights were flown on a Tu-134 flying laboratory.

Cosmonauts V. Lyakhov and A. Aleksandrov spent considerable time studying the colorimetric method of investigating the natural environment. This method is not as simple as it might seem at first glance.

Let us take, for example, the problem of measuring the color of water areas in the World Ocean. Studies of this type have a long history in oceanography. The first means of measuring the color of seawater was devised about 200 years ago. The device used for this consisted of a white disk placed into the water and a set of 19 test tubes containing liquids of various colors. A color catalogue of the waters of the World Ocean was prepared as a result of this painstaking work, which took several decades.

Why do we need such a catalogue? Scientists hope that regular color measurement of the waters of the World Ocean, with rapid reproduction and dissemination of these data by specialists, will make it possible to conduct important research in the field of oceanography, fisheries, and environmental monitoring. The space program is capable of performing such a task. In October 1982, for example, A. Berezovoy and V. Lebedev collected information which made it possible within a few days to reproduce a color catalogue of the waters of the entire World Ocean.

Space hardware offers us a unique opportunity to observe and analyze the state of water masses over enormous areas. V. Lyakhov and A. Aleksandrov, for example, reported during one of their communications sessions: "We see a sharp boundary between the dark-blue waters of the Central and the emerald waters of the Northern Caspian. The boundary runs approximately from Chechen Island to the Tyuleni Islands. We can also see green patches in the southeastern part of the Caspian." This example shows that cosmonauts are capable of identifying the most interesting and high-contrast color zones taking into account the dynamics of the processes taking place in a region.

Specialists from the CEMA member countries conducted an experiment designated "Black Sea" within the framework of the Interkosmos Program. Participating components included orbital complex, an An-30 flying laboratory, and the ship "Professor Kolesnikov." Imaging was conducted at three levels. Simultaneously Vladimir Lyakhov and Aleksandr Aleksandrov were conducting visual observations, dictating onto tape data on the color range of water areas, utilizing a color catalogue.

Colorimetric devices on board the Salyut-7 station were used not only in studying the natural environment. At the suggestion of scientists from the Ukrainian SSR Academy of Sciences Institute of Physics, experiments were conducted within the framework of the Elektrotopograf experiment, involving determination of the color of specimens of coatings of materials and the dynamics of its change under the effect of the vacuum of space.

Study of Earth resources from space with the aid of the Tsvet-1 instrument has just begun, and we hope that this new instrument will make a substantial contribution toward solving this problem.

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